

# **International Thermal Spray Conference (ITSC 2009)**

Las Vegas, Nevada, USA  
4 - 7 May 2009

Volume 1 of 2

## **Editors:**

**B.R. Marple  
M.M. Hyland  
Y.-C. Lau**

**C.-J. Li  
R.S. Lima  
G. Montavon**

ISBN: 978-1-7138-9961-7

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2009) by ASM International  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact ASM International  
at the address below.

ASM International  
9639 Kinsman Road  
Materials Park, Ohio 44073-0002  
USA

Phone: +1 440.338.5151

[memberservicecenter@asminternational.org](mailto:memberservicecenter@asminternational.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## VOLUME 1

|                                                                                                                                                                                                                                    |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Atmospheric Plasma Spraying (APS) Low-Temperature Cathode Materials for Solid Oxide Fuel Cells (SOFCs).....                                                                                                                        | 1  |
| <i>J. Harris, O. Kesler</i>                                                                                                                                                                                                        |    |
| Inelastic Deformation of Freestanding Plasma-Sprayed Thermal Barrier Coatings.....                                                                                                                                                 | 7  |
| <i>M. Arai, X.H. Wu, K. Fujimoto</i>                                                                                                                                                                                               |    |
| Microstructures and Electrochemical Behavior of LSM Cathode with a Structured Electrolyte Modified by Flame Spraying.....                                                                                                          | 12 |
| <i>X.-M. Wang, C.-J. Li, C.-X. Li, G.-J. Yang</i>                                                                                                                                                                                  |    |
| Thermomechanical Evaluation and Thermal Expansion Behavior of Plasma-Sprayed Thermal Barrier Coatings .....                                                                                                                        | 18 |
| <i>K. Takagi, D. Kudo, A. Kawasaki, Y. Harada, M. Okazaki</i>                                                                                                                                                                      |    |
| Fabrication and Properties of MCrAlY/Nanostructured YSZ Thermal Barrier Coating .....                                                                                                                                              | 23 |
| <i>J. Zhang, N. Xu, W.L. Hou, J.Q. Wang, M.X. Quan, X.C. Chang</i>                                                                                                                                                                 |    |
| Effect of High Temperature Calcination on the Phase Compositions of Nanocrystalline Zirconia Powder and Coating .....                                                                                                              | 28 |
| <i>X.L. Jiang, C.B. Liu, L.S. Yu, M. Liu, Z.H. Zhu</i>                                                                                                                                                                             |    |
| Microstructure and Thermal Cycling Behavior of Atmospheric Plasma Sprayed Thermal Barrier Coatings with High Segmentation Crack Densities.....                                                                                     | 34 |
| <i>M. Karger, R. Vaßen, D. Stöver</i>                                                                                                                                                                                              |    |
| Study of Ceramic Coatings as a Novel Optical Imaging Tracking Material Using Plasma Spray Method .....                                                                                                                             | 40 |
| <i>W.H. Liao, W.T. Hsiao, F.S. Shieu, C.Y. Su, M.S. Leu</i>                                                                                                                                                                        |    |
| Microstructure-Based Prediction of Properties for Thermal Barrier Coatings .....                                                                                                                                                   | 46 |
| <i>Fan Qunbo, Wang Fuchi, Wang Lu, Ma Zhuang</i>                                                                                                                                                                                   |    |
| Influence of Microstructure on Thermal Conductivity of Plasma-Sprayed YSZ Coating.....                                                                                                                                             | 51 |
| <i>Y. Li, C.-J. Li, Y.-Z. Xing, G.-J. Yang, C.-X. Li</i>                                                                                                                                                                           |    |
| Influence of Plasma-Sprayed Processes on La <sub>10</sub> (SiO <sub>4</sub> ) <sub>6</sub> O <sub>3</sub> Electrolyte Coatings .....                                                                                               | 56 |
| <i>W. Gao, F. Lapostolle, H.-L. Liao, C. Coddet</i>                                                                                                                                                                                |    |
| Preparation and Characterization of Solid Electrolyte for IT-SOFC Applications Using Atmospheric Plasma Spray Technique: An Inside Understanding by Performance and Stability (PAS) Analysis and Molecular Dynamic Simulation..... | 60 |
| <i>K.L. Tung, K.S. Chang, C.H. Kang, Y.C. Chiang</i>                                                                                                                                                                               |    |
| Atmospheric Plasma Spraying of High Melting Temperature Complex Perovskites for TBC Application .....                                                                                                                              | 65 |
| <i>M.O. Jarligo, D.E. Mack, G. Mauer, R. Vaßen, D. Stöver</i>                                                                                                                                                                      |    |

|                                                                                                                                                              |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Influence of Composition of TGO on the Thermal Shock Lifetime of Thermal Barrier Coatings with Cold-Sprayed MCrAlTaY Bond Coat.....                          | 71  |
| <i>Y. Li, C.-J. Li, Q. Zhang, G.-J. Yang, C.-X. Li</i>                                                                                                       |     |
| Failure of Thermal Barrier Coatings Subjected to CMAS Attack .....                                                                                           | 77  |
| <i>L. Li, N. Hitchman, J. Knapp</i>                                                                                                                          |     |
| Flame Spraying of Mullite/ZrO <sub>2</sub> Powders .....                                                                                                     | 83  |
| <i>E. García, C. Cano, M.I. Osendi, P. Miranzo</i>                                                                                                           |     |
| Degradation of Thermal Barrier Coatings by Fuel Impurities and CMAS .....                                                                                    | 89  |
| <i>Y.H. Sohn, P. Mohan, P. Schelling, D. Nguyen</i>                                                                                                          |     |
| Mullite Coatings Produced by APS and SPS: Effect of Powder Morphology and Spray Processing on Microstructure, Crystallinity, and Mechanical Properties ..... | 97  |
| <i>Y. Wang, R.S. Lima, C. Moreau, E. Garcia, J. Guimaraes, P. Miranzo, M.I. Osendi</i>                                                                       |     |
| Microstructure and Electrical Properties of Coatings of the Cr <sub>2</sub> O <sub>3</sub> -TiO <sub>2</sub> System.....                                     | 103 |
| <i>L.-M. Berger, C.C. Stahr, S. Saaro, S. Thiele</i>                                                                                                         |     |
| Plasma Spraying of Lanthanum Silicate Electrolytes for Intermediate Temperature Solid Oxide Fuel Cells (ITSOFCs).....                                        | 109 |
| <i>S. Dru, E. Meillot, K. Wittmann-Teneze, M.-L. Saboungi, R. Benoit</i>                                                                                     |     |
| Mullite and Mullite/ZrO <sub>2</sub> -7wt%Y <sub>2</sub> O <sub>3</sub> Powders for Thermal Spraying of Environmental Barrier Coatings.....                  | 115 |
| <i>E. Garcia, J. Guimarães, P. Miranzo, M.I. Osendi, Y. Wang, R.S. Lima, C. Moreau</i>                                                                       |     |
| Gastight Ytria-Partially Stabilized Zirconia Layers Manufactured by Suspension Plasma Spraying for SOFC Electrolyte Functional Layers .....                  | 120 |
| <i>E. Brousse, G. Montavon, A. Denoirjean, P. Fauchais, K. Wittmann-Teneze</i>                                                                               |     |
| Plasma Sprayed Metal Supported SOFCs Having Enhanced Performance and Durability .....                                                                        | 126 |
| <i>A. Ansar, Z. Ilhan, J. Arnold</i>                                                                                                                         |     |
| Investigation of Plasma Sprayed and Constrained-Sintered Zirconia Based Electrolytes .....                                                                   | 131 |
| <i>C. Christenn, S.A. Ansar</i>                                                                                                                              |     |
| Latest Developments in Suspension and Liquid Precursor Thermal Spraying .....                                                                                | 136 |
| <i>P. Fauchais, G. Montavon</i>                                                                                                                              |     |
| High Velocity Suspension Flame Spraying (HVSFS): Process Development and Industrial Applications.....                                                        | 150 |
| <i>J. Rauch, N. Stiegler, A. Killinger, R. Gadow</i>                                                                                                         |     |
| Suspension Plasma Sprayed Titanium Oxide and Hydroxyapatite Coatings.....                                                                                    | 156 |
| <i>R. Jaworski, L. Pawlowski, C. Pierlot, F. Roudet, S. Kozerski, F. Petit</i>                                                                               |     |
| Suspension Plasma Spraying: Process Development and Applications.....                                                                                        | 162 |
| <i>R. Vaßen, H. Kaßner, G. Mauer, D. Stöver</i>                                                                                                              |     |
| Microstructures and Functional Properties of Al <sub>2</sub> O <sub>3</sub> and TiO <sub>2</sub> Suspension Sprayed Coatings: An Overview .....              | 168 |
| <i>F.-L. Toma, L.-M. Berger, C.C. Stahr, T. Naumann, S. Langner</i>                                                                                          |     |
| Al <sub>2</sub> O <sub>3</sub> – ZrO <sub>2</sub> Finely Structured Multilayer Architectures from Suspension Plasma Spraying .....                           | 174 |
| <i>O. Tingaud, G. Montavon, A. Denoirjean, J.-F. Coudert, V. Rat, P. Fauchais</i>                                                                            |     |

|                                                                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Elaboration of Porous Ni/8YSZ Cermet Layers by Several SPS and SPPS Routes .....                                                                                     | 181 |
| <i>P. Michaux, G. Montavon, A. Grimaud, A. Denoirjean, P. Fauchais</i>                                                                                               |     |
| In-Situ Particle Behavior of Cast Iron Powder by Suspension Plasma Spraying .....                                                                                    | 187 |
| <i>C. Tekmen, K. Iwata, Y. Tsunekawa, M. Okumiya</i>                                                                                                                 |     |
| Sub-Micrometer-Sized Y-PSZ Thermal Barrier Coatings Manufactured by Suspension Plasma<br>Spraying: Process, Structure and Some Functional Properties .....           | 193 |
| <i>F. Ben-Ettouil, A. Denoirjean, A. Grimaud, G. Montavon, P. Fauchais</i>                                                                                           |     |
| Basic Principles to Obtain Oxide Ceramic Coating Systems with Reduced Sliding Wear by<br>Suspension Plasma Spraying .....                                            | 200 |
| <i>M. Erne, Fr.-W. Bach, K. Möhwald, D. Kolar</i>                                                                                                                    |     |
| Deposition of TiO <sub>2</sub> Coatings: Comparison Between High Velocity Suspension Flame Spraying<br>(HVSFS), Atmospheric Plasma Spraying, and HVOF Spraying ..... | 207 |
| <i>G. Bolelli, V. Cannillo, L. Lusvarghi, R. Gadow, A. Killinger, J. Rauch, E. Bemporad, M. Sebastiani</i>                                                           |     |
| Dry Sliding Behavior of Sub-Micrometer-Sized Suspension Plasma Sprayed Ceramic Oxide<br>Coatings .....                                                               | 213 |
| <i>G. Darut, F. Ben-Ettouil, A. Denoirjean, G. Montavon, H. Ageorges, P. Fauchais</i>                                                                                |     |
| WC-Based Coating Production by the Pulsed Gas Dynamic Spraying Process: Coatings and<br>Process Analysis .....                                                       | 219 |
| <i>M. Yandouzi, B. Jodoin</i>                                                                                                                                        |     |
| Properties of Copper Coatings Obtained by Cold Gas Dynamic Spraying Using Helium: Influence<br>of the Oxide Content of the Powder .....                              | 225 |
| <i>T. Kairet, S. Godet, M. Degrez, S. Alexandre</i>                                                                                                                  |     |
| Effects of Gas Temperature, Gas Pressure, and Particle Characteristics on Cold Sprayed Pure<br>Titanium Coatings .....                                               | 231 |
| <i>W. Wong, A. Rezaeian, S. Yue, E. Irissou, J.-G. Legoux</i>                                                                                                        |     |
| Effects of Cold Spray Process Gas Temperature on CP Titanium Structure .....                                                                                         | 237 |
| <i>S. Gulizia, B. Tiganis, M.Z. Jahedi, N. Wright, T. Gengenbach, C. MacRae</i>                                                                                      |     |
| Microstructural Development in Cold Sprayed Copper .....                                                                                                             | 243 |
| <i>P.C. King, S.H. Zahiri, M. Jahedi</i>                                                                                                                             |     |
| Formation of Diamond-NiCrAl Cermet Coating Through Cold Spray .....                                                                                                  | 249 |
| <i>X.-K. Suo, C.-J. Li, G.-J. Yang, C.-X. Li</i>                                                                                                                     |     |
| Improved Deposition Characteristics of Diamond Enhanced by Plastically Deformed Nickel Layer<br>in Kinetic Sprayed Bronze-Diamond Composite Coating .....            | 255 |
| <i>H. Na, G. Bae, S. Yoon, C. Lee, H.J. Kim</i>                                                                                                                      |     |
| Kinetic Metallization – a Repair Process for Damaged IVD-Al Coatings, Mg, and Al Alloy<br>Components .....                                                           | 261 |
| <i>R. Tapphorn, J. Henness, H. Gabel</i>                                                                                                                             |     |
| Development of High Temperature Gas Heater in the Cold Spray Coating System .....                                                                                    | 267 |
| <i>H. Fukanuma, R. Huang</i>                                                                                                                                         |     |
| Deposition Behavior of Copper Particles onto Flat Substrate Surface in Cold Spraying .....                                                                           | 273 |
| <i>M. Fukumoto, M. Mashiko, M. Yamada, E. Yamaguchi</i>                                                                                                              |     |

|                                                                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| The Influence of Spray Conditions on Deposition Characteristics of Aluminum Coatings in Cold Spraying .....                                                                           | 279 |
| <i>R.Z. Huang, H. Fukanuma</i>                                                                                                                                                        |     |
| The Effect of Ni Coating for Diamond on Metal-Diamond Composite Coatings by Cold Spray Deposition .....                                                                               | 285 |
| <i>H.J. Kim, D.J. Jung, C. Lee</i>                                                                                                                                                    |     |
| Thermally Enhanced Kinetic Sprayed Titanium Coating: Microstructure and Property Improvement for Potential Applications .....                                                         | 290 |
| <i>G. Bae, K. Kang, H. Na, C. Lee, H.J. Kim</i>                                                                                                                                       |     |
| Investigation of Aluminum Coating with Dispersed Nanoscale Quasicrystalline Particles Produced by Cold Spray.....                                                                     | 296 |
| <i>M. Hishida, M. Fujita, K. Sakaki</i>                                                                                                                                               |     |
| Effects of Gas Pressure of Cold Spray on the Formation of Al Based Intermetallic Compound.....                                                                                        | 302 |
| <i>H. Lee, H. Shin, K. Ko</i>                                                                                                                                                         |     |
| Kinetic Metallization – Coating Development System .....                                                                                                                              | 308 |
| <i>R. Tapphorn, H. Gabel, J. Henness</i>                                                                                                                                              |     |
| Structure and Corrosion Behavior of Cold-Sprayed Tantalum Coatings.....                                                                                                               | 314 |
| <i>H. Koivuluoto, P. Vuoristo, J. Näkki</i>                                                                                                                                           |     |
| TEM Microstructural Investigation of MCrAlY Coatings Manufactured by Cold Gas Dynamic Spraying .....                                                                                  | 320 |
| <i>P. Richer, M. Yandouzi, B. Jodoin, A. Zúñiga</i>                                                                                                                                   |     |
| Fabrication of Cu-MoS <sub>2</sub> Composite Coating by Cold Spraying and Evaluation of Its Property .....                                                                            | 326 |
| <i>M. Yamada, J. Wakabayashi, M. Fukumoto, J. Kitamura</i>                                                                                                                            |     |
| Toughening of Cold-Sprayed Nanostructured WC-12Co Deposit Through Using Multimodal WC Particles and Annealing .....                                                                   | 331 |
| <i>G.-J. Yang, P.-H. Gao, C.-J. Li, C.-X. Li</i>                                                                                                                                      |     |
| Post Treatment of Cold Sprayed Metallic Ti-Al to Achieve Thick Ti <sub>2</sub> AlN Coating .....                                                                                      | 337 |
| <i>Caixian Tang, Stefan Gulizia, Mahnaz Jahedi</i>                                                                                                                                    |     |
| Influence of Spray Materials and Their Surface Oxidation on the Critical Velocity in Cold Spraying .....                                                                              | 342 |
| <i>C.-J. Li, H.-T. Wang, Q. Zhang, G.-J. Yang, W.-Y. Li, H.L. Liao</i>                                                                                                                |     |
| Thermal Stability of Cold Spray Titanium Structures .....                                                                                                                             | 348 |
| <i>Mahnaz Jahedi, Saden H. Zahiri</i>                                                                                                                                                 |     |
| Nano Titania Embedded Hydroxyapatite Coating by Precursor Plasma .....                                                                                                                | 354 |
| <i>V. Varadaraajan, R. Visveswaran, P.S. Mohanty</i>                                                                                                                                  |     |
| A Study on the Influence of Plasma Deposited HA and TiO <sub>2</sub> Coatings on Fatigue Lives of Low-Carbon Steel Specimens with Respect to Various Powder In-Flight Properties..... | 361 |
| <i>J. Cizek, K.A. Khor, J. Siegl, J. Bensch</i>                                                                                                                                       |     |
| Enhanced Proliferation and Growth of Human Stem Cells on the Surface of HVOF-Sprayed Nano TiO <sub>2</sub> -HA Coatings.....                                                          | 366 |
| <i>R.S. Lima, S. Dimitrievska, M.N. Bureau, B.R. Marple, A. Petit, F. Mwale, J. Antoniou</i>                                                                                          |     |

|                                                                                                                                                             |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Microstructure and Biological Properties of Plasma Sprayed Novel Bioactive Coatings .....                                                                   | 372 |
| <i>X.-Y. Liu, C.-X. Ding</i>                                                                                                                                |     |
| Bactericidal Effects of HVOF-Sprayed Nanostructured TiO <sub>2</sub> on <i>Pseudomonas Aeruginosa</i> .....                                                 | 376 |
| <i>B. Jeffery, A. McDonald, M. Pepler, R.S. Lima</i>                                                                                                        |     |
| Research on Plasma Sprayed High Crystallinity Degree Hydroxyapatite Powder for Biological Coating .....                                                     | 382 |
| <i>Li Zhenduo, Yu Yueguang, Zeng Keli, Zhan Jia, Zhao Xiaodong</i>                                                                                          |     |
| Antibacterial Property and Biocompatibility of Plasma Sprayed Hydroxyapatite-Silver Composite Coatings.....                                                 | 386 |
| <i>Xuebin Zheng, Yikai Chen, Youtao Xie, Heng Ji, Liping Huang, Chuanxian Ding</i>                                                                          |     |
| Bio-Ceramic Composite Coatings by Cold Spray Technology .....                                                                                               | 391 |
| <i>A. Choudhuri, P.S. Mohanty, J. Karthikeyan</i>                                                                                                           |     |
| Enhanced TBC Performance with Nanostructured Bond Coats .....                                                                                               | 397 |
| <i>G.E. Kim, M. Brochu, A. Moran, T. Addona</i>                                                                                                             |     |
| Properties of Powders, Coatings and Consolidated Components Produced from Nano- And Near-Nano Crystalline Powders .....                                     | 403 |
| <i>S. Schroeder, C. Melnyk, D. Grant, R. Gansert, G. Saha, L. Glenesk</i>                                                                                   |     |
| Phase Formation in Alumina-YSZ Nano-Composite Coating Deposited by Suspension Plasma Spray Process .....                                                    | 409 |
| <i>F. Tarasi, M. Medraj, A. Dolatabadi, J. Oberste-Berghaus, C. Moreau</i>                                                                                  |     |
| Behavior of HVOF WC-10Co4Cr Coatings with Different Carbide Size in Fine and Coarse Particle Abrasion .....                                                 | 415 |
| <i>Arash Ghabchi, Tommi Varis, Erja Turunen, Tomi Suhonen, Xuwen Liu, S.-P. Hannula, Arash Ghabchi</i>                                                      |     |
| Nano Particle Embedded High Temperature FGM Coatings by Hybrid Spray Process .....                                                                          | 420 |
| <i>R.K. Guduru, V. Varadaraajan, A.D. Roche, P.S. Mohanty</i>                                                                                               |     |
| Finite Element Analysis of Mechanical Responses of Plasma Sprayed Composite Coatings at the Structural Scale: Effect of the Pore Network Architecture ..... | 426 |
| <i>C.P. Espinosa, G. Antou, A. Denoirjean, G. Montavon</i>                                                                                                  |     |
| Modeling Aspects of High Velocity Impact of Particles in Cold Spraying by Explicit Finite Element Analysis .....                                            | 432 |
| <i>W.-Y. Li, C.-J. Li, H. Liao</i>                                                                                                                          |     |
| Numerical Approach and Optimization of the Combustion and Injection Techniques in High Velocity Suspension Flame Spraying (HVSFS) .....                     | 442 |
| <i>E. Dongmo, R. Gadow, A. Killinger</i>                                                                                                                    |     |
| Numerical Investigation of the Influence of Injection Modes in the Solution Precursor Plasma Spraying .....                                                 | 450 |
| <i>Y. Shan, Z.P. Wei, T. Coyle, J. Mostaghimi</i>                                                                                                           |     |
| Predict Flexural Rigidity of Sandwich Structures Using Mechanical Properties of the Constituents .....                                                      | 456 |
| <i>F. Azarmi, T.W. Coyle, J. Mostaghimi</i>                                                                                                                 |     |

|                                                                                                                                                                                                             |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| The Role of Substrate Surface Chemistry on Splat Formation During Plasma Spray Deposition by Experiments and Simulations .....                                                                              | 462 |
| <i>A.T.T. Tran, M.M. Hyland</i>                                                                                                                                                                             |     |
| A Study on Arc Instability Phenomena of a Hollow Cathode Plasma Torch in a Low Pressure Environment .....                                                                                                   | 469 |
| <i>J. Stanisic, A. George, P.S. Mohanty</i>                                                                                                                                                                 |     |
| Numerical Model for Liquid Precursor Break-Up Under Plasma Spray Conditions.....                                                                                                                            | 475 |
| <i>C. Marchand, G. Mariaux, M. Vardelle, A. Vardelle, P. Lefort</i>                                                                                                                                         |     |
| Modeling a New Spray Process Combining Plasma and HVOF .....                                                                                                                                                | 481 |
| <i>B. Martinez, G. Mariaux, A. Vardelle, G. Barykin, M. Parco</i>                                                                                                                                           |     |
| Advanced Robot Programming and Coupled Numerical Simulation of Heat Transfer for Thermal Spraying .....                                                                                                     | 487 |
| <i>A. Candel, R. Gadow</i>                                                                                                                                                                                  |     |
| A Deposition Model for Wire Arc Spraying and Its Computationally Efficient Simulation.....                                                                                                                  | 492 |
| <i>T. Wiederkehr, H. Müller, B. Krebs, M. Abdulgader</i>                                                                                                                                                    |     |
| Current Status and Future Prospect of Thermal Spray Coating Applications and Coating Service Market of Job Shops in Japan.....                                                                              | 499 |
| <i>A. Nakahira</i>                                                                                                                                                                                          |     |
| Market Direction and Application Opportunities for Thermal Spray Growth in Korea .....                                                                                                                      | 505 |
| <i>C. Lee</i>                                                                                                                                                                                               |     |
| Thermal Spraying in India: Status and Prospects .....                                                                                                                                                       | 511 |
| <i>G. Sundararajan, Y.R. Mahajan, S.V. Joshi</i>                                                                                                                                                            |     |
| Industrial and Research Activities in Thermal Spray Technology in the Nordic Region of Europe .....                                                                                                         | 517 |
| <i>P. Vuoristo, P. Nylén</i>                                                                                                                                                                                |     |
| Thermal Spraying of FeNiW Coatings to Improve the Performance of Casting Molds in the Aluminum Industry .....                                                                                               | 523 |
| <i>J. Wilden, S. Jahn, V.E. Drescher</i>                                                                                                                                                                    |     |
| Thermal and Kinetic Energy Influence on Diamonds During the Spraying of Diamond-Bronze Abrasive Coatings .....                                                                                              | 528 |
| <i>J. Nebel, E. Vogli, W. Tillmann</i>                                                                                                                                                                      |     |
| Hydraulic Characteristics and Thermal Properties of Metal Foam Sandwich Structure for High Temperature Heat Exchanger Applications .....                                                                    | 535 |
| <i>H.R. Salimijazi, J. Mostaghimi, L. Pershin, T.W. Coyle, S. Chandra</i>                                                                                                                                   |     |
| Influence of Powder Properties and Plasma Spray Conditions on Erosion Resistance of Yttrium Oxide Coatings Against Halogen Plasma for Dry Etching Process in Semiconductor and Electronic Applications..... | 541 |
| <i>H. Ibe, K. Sato, F. Yuasa, H. Mizuno, J. Kitamura</i>                                                                                                                                                    |     |
| Microstructure Evolution and Dielectric Properties of Plasma Sprayed BaTiO <sub>3</sub> Coatings.....                                                                                                       | 547 |
| <i>Y.-M. Kim, K.-H. Baik, K.-S. Park</i>                                                                                                                                                                    |     |
| Preparation and Ion Diffusion Performance of the Nanoporous TiO <sub>2</sub> Coating Through Vacuum Cold Spray.....                                                                                         | 551 |
| <i>G.-J. Yang, C.-J. Li, C.-X. Li, J.-C. Gao, S.-Q. Fan</i>                                                                                                                                                 |     |

|                                                                                                                                                                                              |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Development of Kinetic Sprayed Coatings for the Application of Die Soldering Resistance .....                                                                                                | 556 |
| <i>F.F. Khan, G. Bae, K. Kang, S. Kumar, H. Na, J. Kim, C. Lee</i>                                                                                                                           |     |
| A Case Study of Arc-Spray Tooling Process for Production of Sheet Metal Forming Dies .....                                                                                                   | 562 |
| <i>B.-G. Seong, J.-H. Kim, J.-H. Ahn, K.-H. Baik</i>                                                                                                                                         |     |
| Structural, Mechanical and Erosion Properties of Plasma Sprayed Yttrium Oxide Coatings by Axial Injection of Fine Powder Slurries for Semiconductor and Flat-Panel-Display Applications..... | 567 |
| <i>J. Kitamura, H. Ibe, F. Yuasa, Z. Tang, A. Burgess</i>                                                                                                                                    |     |
| Synthesis and Microstructure Evolution of Nano-Titania Doped Silicon Coatings .....                                                                                                          | 573 |
| <i>N.A. Moroz, H. Umapathy, P. Mohanty</i>                                                                                                                                                   |     |
| Glaze Coatings Manufactured by Flame Spraying onto Thermally Sensitive Substrates: Heat Flux Measurements and Some Mechanical Properties .....                                               | 579 |
| <i>A. Arcondéguy, O. Preziosa, G. Montavon, B. Pateyron, A. Grimaud, A. Denoirjean, G. Gasgnier, C. Huguet, M.-P. Planche</i>                                                                |     |
| Defect Reduction in Semiconductor Through Thermal Spray Technology .....                                                                                                                     | 585 |
| <i>H. Wang</i>                                                                                                                                                                               |     |
| Direct Write of Antenna Aperiodic Structures and Electronic Interconnects Using Kinetic Metallization .....                                                                                  | 589 |
| <i>R.M. Tapphorn, J.A. Henness, H. Gabel</i>                                                                                                                                                 |     |
| Effect of Mn on the Formation of Pickups on Thermal Spray Coatings.....                                                                                                                      | 595 |
| <i>T.-S. Huang, C.-S. Yu, J.-R. Wu, H.-Y. Liou, S.-H. Hsieh, T.-K. Huang, C.-Y. Su</i>                                                                                                       |     |
| Advances of Thermal Sprayed Carbon Roller in Paper Industry .....                                                                                                                            | 601 |
| <i>A. Yoshiya, S. Shigemura, M. Nagai, M. Yamanaka</i>                                                                                                                                       |     |

## VOLUME 2

|                                                                                                                                                        |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Thermal-Sprayed CFRP Rolls with Resistance to Thermal Shock and Wear for Papermaking Machines .....                                                    | 607 |
| <i>M. Nagai, S. Shigemura, A. Yoshiya</i>                                                                                                              |     |
| Electrically Conductive Plasma Sprayed Oxide-Metal Coatings on Glass Ceramic Substrates .....                                                          | 612 |
| <i>M. Floristán, R. Gadow, A. Killinger</i>                                                                                                            |     |
| Production of Metallic Coatings on Polymer-Matrix Composites.....                                                                                      | 618 |
| <i>F. Robitaille, M. Yandouzi, B. Jodoin, S. Hind</i>                                                                                                  |     |
| Plasma Sprayed Ceramic Tray Members for Firing Ceramic Capacitors .....                                                                                | 624 |
| <i>O. Yamakawa, H. Nihonmatsu, M. Morisasa, H. Hotta</i>                                                                                               |     |
| Thermally-Sprayed BaCoTiFe10O19 Layers as Microwave Absorbers.....                                                                                     | 628 |
| <i>G. Bolelli, L. Lusvarghi, D. Lisjak, A. Hujanen, P. Lintunen, U. Kanerva, T. Varis, M. Bégard, K. Richardt, T. Schläfer, K. Bobzin, M. Pasquale</i> |     |
| Ultra-High Temperature Resistance Coatings for Thermal Protection of Space Vehicles .....                                                              | 634 |
| <i>M. Tului, S. Lionetti, G. Marino, R. Gardi, T. Valente, G. Pulci</i>                                                                                |     |
| Optimized Arc Wire Sprayed Fiber Prepregs for Advanced Manufacturing of Metal Matrix Composites (MMCs) .....                                           | 639 |
| <i>M. Silber, R. Gadow</i>                                                                                                                             |     |

|                                                                                                                                                       |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Parameters Affecting Bond Strength and Surface Roughness in Twin Wire Arc Spray Aluminum Coatings.....                                                | 644 |
| <i>M. Watson, R. Gansert</i>                                                                                                                          |     |
| Production of Particle Reinforced Graded Coatings by Wire Arc Spraying .....                                                                          | 648 |
| <i>F. van Rodijnen, S. Knapp, J. Wilden, S. Jahn, V.E. Drescher</i>                                                                                   |     |
| Influence of Spray Gun Moving Direction on Properties of Twin Wire Arc Sprayed Hard Material Based Layers .....                                       | 653 |
| <i>W. Tillmann, E. Vogli, M. Abdulgader, K.R. Carpenter, B.J. Monaghan, J. Norrish</i>                                                                |     |
| The Effects of Crystallinity and Microstructure on Corrosion Resistance of Atmospheric Plasma Sprayed Cu-Based Bulk Metallic Glass Coating .....      | 659 |
| <i>J.H. Kim, S. Kumar, S. Yoon, C. Lee</i>                                                                                                            |     |
| Densifying Method of Corrosion and Wear Resistant Coatings by Using Nanoparticles.....                                                                | 663 |
| <i>S. Armada, N. Espallargas, B.G. Tilset, M. Pilz, R. Liltvedt, H. Bratland</i>                                                                      |     |
| Study on Corrosion Behavior of Cold Sprayed Al-AAI2O3 Deposit on AZ91D Alloy .....                                                                    | 669 |
| <i>T. Xiong, Y. Tao, C. Sun, H. Jin, H. Du, T. Li</i>                                                                                                 |     |
| Corrosion of APS- And HVOF-Sprayed Coatings of the Al2O3-TiO2 System .....                                                                            | 673 |
| <i>F.-L. Toma, C.C. Stahr, L.-M. Berger, M. Herrmann, D. Deska, G. Michael</i>                                                                        |     |
| High Temperature Corrosion Behavior of Cold Spray Ni-20Cr Coating on Boiler Steel in Molten Salt Environment at 900 °C.....                           | 679 |
| <i>N. Bala, H. Singh, S. Prakash</i>                                                                                                                  |     |
| A Comparative Study on the Role of Zirconium as a Minor Addition in HVOF Spray Ni-20Cr Coatings in Enhancing the Life of Boiler Steel .....           | 685 |
| <i>G. Kaushal, H. Singh, S. Prakash</i>                                                                                                               |     |
| Corrosion and Erosion Resistant Thermal Spray Coatings of Fe-Si Intermetallics .....                                                                  | 691 |
| <i>T. Okagaito, Y. Fukuda</i>                                                                                                                         |     |
| Wire Arc Sprayed High Quality Anti-Corrosion and Wear-Resistant Coatings.....                                                                         | 695 |
| <i>J. Wilden, S. Jahn, S. Reich, V.E. Drescher, R. Durham, M. Schütze</i>                                                                             |     |
| Statistical Design of HVOF Spray Experiments to Manufacture Superfine Structured Wear Resistant Cr3C2-25(Ni20Cr) Coatings.....                        | 700 |
| <i>W. Tillmann, E. Vogli, I. Baumann, G. Kopp, C. Weihs</i>                                                                                           |     |
| Gas-Dynamic Improvement of HVOF Systems – Development Aspects and Applications.....                                                                   | 709 |
| <i>B. Wielage, G. Paczkowski, C. Rupprecht</i>                                                                                                        |     |
| High-Velocity Collision of Hot Particles with Solid Substrate Under Detonation Spraying: Detonation Splats .....                                      | 714 |
| <i>S.B. Zlobin, V.Yu. Ulianitsky, A.A. Shtertser, I. Smurov</i>                                                                                       |     |
| Low Cost HVOF for Thermal Spraying of WC-Co .....                                                                                                     | 718 |
| <i>I.A. Goralach</i>                                                                                                                                  |     |
| Further Developments in Internal Diameter HVOF Application of WC-CoCr for Hard Chrome Replacement in Critical Applications Such as Landing Gear ..... | 722 |
| <i>G. Matthäus, J. Henry, D. Ackermann, W. Brandl</i>                                                                                                 |     |

|                                                                                                                                                         |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Low Pressure Plasma Spray – Thin Film at Sandia National Laboratories .....                                                                             | 725 |
| <i>A.C. Hall, J.F. McCloskey, D.A. Urrea, T.J. Roemer, D.E. Beatty, N.R. Spinhirne, D.A. Hirschfeld</i>                                                 |     |
| Vapor Phase Deposition Using LPPS Thin Film .....                                                                                                       | 729 |
| <i>K. von Niessen, M. Gindrat, A. Refke</i>                                                                                                             |     |
| LPPS – Thin Film Processes: Overview of Origin and Future Possibilities .....                                                                           | 737 |
| <i>E. Muehlberger, P. Meyer</i>                                                                                                                         |     |
| Use of Low-Pressure Plasma Spraying Equipment to Produce Thin Films and Thick Coatings<br>Using Liquid and Gaseous Precursors .....                     | 741 |
| <i>Ph. Guittienne, Ch. Hollenstein, J.-L. Dorier, M. Gindrat, A. Refke</i>                                                                              |     |
| Tungsten Thin Films and Nanometer Powder by Low Pressure Plasma Spray .....                                                                             | 746 |
| <i>T.N. McKechnie, J.S. O'Dell</i>                                                                                                                      |     |
| The Development and Characterization of Novel Ytria-Stabilized Zirconia Coatings Deposited by<br>Very Low Pressure Plasma Spray .....                   | 750 |
| <i>N. Spinhirne, D. Hirschfeld, A. Hall, J. McCloskey</i>                                                                                               |     |
| A Novel Single Cathode Plasma Column Design for Process Stability and Long Component Life .....                                                         | 756 |
| <i>P.S. Mohanty, A. George, L. Pollard, D. Snyder</i>                                                                                                   |     |
| Homogenization of Coating Properties in Atmospheric Plasma Spraying – New Results of a DFG<br>(German Research Foundation)-Funded Research Group .....  | 762 |
| <i>K. Bobzin, N. Bagcivan, D. Parkot, I. Petkovic, J. Schein, G. Forster, S. Zimmermann, J.-L. Marques, Fr.-W. Bach, K. Möhwald, J. Prehm, K. Hartz</i> |     |
| Investigation of Plasma Spraying with Internal Axial Powder Injection .....                                                                             | 768 |
| <i>Y. Gao, D.-M. Yang, Z.-J. Yan</i>                                                                                                                    |     |
| Thin and Dense Ceramic Coatings by Plasma Spraying at Very Low Pressure .....                                                                           | 773 |
| <i>G. Mauer, R. Vaßen, D. Stöver</i>                                                                                                                    |     |
| Microstructure and Mechanical Properties of Flame-Sprayed PEEK Coating Remelted by Laser<br>Process .....                                               | 779 |
| <i>C. Zhang, H. Liao, S. Costil, C. Coddet, G. Zhang</i>                                                                                                |     |
| Industrial Applications for Polymer Coatings with Release Properties in Combination with Thermal<br>Spray Coatings .....                                | 786 |
| <i>J. McCook, B. Hyllberg</i>                                                                                                                           |     |
| Study of the Splat-Substrate Interface for a PEEK Coating Plasma-Sprayed onto Aluminum<br>Substrates .....                                              | 793 |
| <i>J. Wu, P.R. Munroe, B. Withy, M.M. Hyland</i>                                                                                                        |     |
| Influence of Powders on Thermal Spray Coating Structures: Recent Developments in Nano Or<br>Finely Structured Coatings and Some Safety Issues .....     | 799 |
| <i>P. Fauchais, G. Montavon, G. Bertrand</i>                                                                                                            |     |
| Novel NiZn-Ferrite Powders and Coatings for Electromagnetic Applications .....                                                                          | 818 |
| <i>D.G. McCartney, D. Zhang, J.Y. Yellup, M. Brühl, K. Bobzin, K. Richardt, T. Talako, A. Ilyushchanka</i>                                              |     |
| Plasma Spraying of Refractory Cermets by the Water-Stabilized Spray (WSP) System .....                                                                  | 824 |
| <i>P. Ctibor, P. Chraska, V. Brozek, D.-I. Cheong, S.-H. Yang</i>                                                                                       |     |

|                                                                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| The Influence of Spray Parameters on the Characteristics of Al <sub>2</sub> O <sub>3</sub> Particles and Coatings Sprayed by Detonation Spray ..... | 830 |
| <i>B. Sun, H. Fukanuma, N. Ohno</i>                                                                                                                 |     |
| Metal Clad Cermet Powders: Processing and Properties.....                                                                                           | 836 |
| <i>A.J. Sherman, P.G. Engleman</i>                                                                                                                  |     |
| Preparation of High-Purity Yttria Powders and Coatings.....                                                                                         | 841 |
| <i>X.-J. Ji, X.-J. Ren, Zh.-D. Li, X.-Ch. Huang, W.-Ao Hou</i>                                                                                      |     |
| Development of Iron Based Wire Feedstocks and Their Processing by Electric Arc Spraying.....                                                        | 844 |
| <i>K. Bobzin, T. Schläfer, L. Zhao, P. Kutschmann</i>                                                                                               |     |
| Microstructure and Properties of New Developed Fe-Cr-C-B Powders for Wear-Protection Purposes .....                                                 | 849 |
| <i>A. Pelz</i>                                                                                                                                      |     |
| Particle Image Velocimetry Diagnostics for Suspension Plasma Spraying .....                                                                         | 855 |
| <i>O. Marchand, G. Bertrand, M.P. Planche, Y. Bailly, L. Girardot</i>                                                                               |     |
| Comparison of In-Flight Particle Properties, Splat Formation, and Coating Microstructure for Regular and Nano-YSZ Powders .....                     | 861 |
| <i>A. Elsebaei, J. Heberlein, M. Elshaer, A. Farouk</i>                                                                                             |     |
| Estimation of Molten Content of the Spray Stream from Analysis of Experimental Particle Diagnostics .....                                           | 866 |
| <i>V. Srinivasan, S. Sampath</i>                                                                                                                    |     |
| Influence of Convergent-Divergent Nozzle Design on Plasma Properties and Resultant Coatings .....                                                   | 872 |
| <i>N. Caron, C. Macqueron, E. Meillot</i>                                                                                                           |     |
| Improved Thermal Spray Consistency Via Plume Sensors – an Aerospace Perspective .....                                                               | 878 |
| <i>J.P. Sauer, T. Grijilva, L. Pouliot</i>                                                                                                          |     |
| Alumina Splat Investigation: Visualization of Impact and Splat / Substrate Interface for Millimeter Sized Drops .....                               | 883 |
| <i>S. Goutier, M. Vardelle, J.C. Labbe, P. Fauchais</i>                                                                                             |     |
| Process Measurement and Data Storage Integrated in a Thermal Spray Gun .....                                                                        | 889 |
| <i>U. Rueedi, A. Kilchenmann</i>                                                                                                                    |     |
| Study of In-Flight and Impact Dynamics of Non-Spherical Particles from HVOF Guns .....                                                              | 895 |
| <i>S. Kamnis, S. Gu</i>                                                                                                                             |     |
| In Situ Monitoring of Particle Consolidation During Low Pressure Cold Spray by Ultrasonic Techniques.....                                           | 902 |
| <i>M. Lubrick, S. Titov, V. Leshchynsky, D. Dzhurinskiy, R.Gr. Maev</i>                                                                             |     |
| Corrosion Behavior and Microstructure of Al-Al <sub>2</sub> O <sub>3</sub> Coatings Produced by Low-Pressure Cold Spraying .....                    | 908 |
| <i>J. Villafruerte, D. Dzhurinskiy, R. Ramirez, E. Maeva, V. Leshchynsky, R.Gr. Maev</i>                                                            |     |
| Non-Linear Mechanical Behavior of Plasma Sprayed Coatings Under Mechanical and Thermal Loading.....                                                 | 914 |
| <i>R. Musalek, J. Matejcek, M. Vilemova, O. Kovarik</i>                                                                                             |     |

|                                                                                                                                                                                                         |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Characterization of Complex Thermal Barrier Deposits Pore Microstructures by a Combination of Imaging, Scattering and Intrusion Techniques.....                                                         | 920  |
| <i>J. Ilavsky</i>                                                                                                                                                                                       |      |
| Porous Architecture of SPS Thick Y-PSZ Coatings Structured at the Sub-Micrometer Scale.....                                                                                                             | 931  |
| <i>A. Bacciochini, G. Montavon, A. Denoirjean, P. Fauchais</i>                                                                                                                                          |      |
| Relationship Between the Interlamellar Bonding and Properties of Plasma-Sprayed Y <sub>2</sub> O <sub>3</sub> -ZrO <sub>2</sub> Coatings.....                                                           | 939  |
| <i>Y.-Z. Xing, C.-J. Li, C.-X. Li, G.-J. Yang</i>                                                                                                                                                       |      |
| Microstructure, Mechanical and Shielding Properties of Fe <sub>67.5</sub> Ni <sub>23.5</sub> B <sub>9</sub> Coating / 321 Stainless Steel Laminated Composite by the Air-Plasma Spraying Procedure..... | 945  |
| <i>W. Yang, C. Zhou</i>                                                                                                                                                                                 |      |
| Characterization of Atomized Metallic Powders Using De Laval Nozzle.....                                                                                                                                | 952  |
| <i>O. Khatim, M.P. Planche, L. Dembinski, C. Coddet</i>                                                                                                                                                 |      |
| An Approach to Control the Interlamellar Bonding of Plasma-Sprayed Y <sub>2</sub> O <sub>3</sub> -ZrO <sub>2</sub> Coatings Through Deposition Temperature.....                                         | 957  |
| <i>C.-J. Li, Y.-Z. Xing, C.-X. Li, G.-J. Yang</i>                                                                                                                                                       |      |
| Improvement of Impact Resistance of WC-Cr <sub>3</sub> C <sub>2</sub> -Ni Based Coatings by Means of Hardness Control of Undercoat.....                                                                 | 963  |
| <i>J. Kitamura, S. Osawa, H. Ibe, H. Mizuno, S. Tawada</i>                                                                                                                                              |      |
| Effects of Some Light Alloying Elements on the Oxidation Behavior of Fe and Ni-Cr Based Alloys During Air Plasma Spraying.....                                                                          | 968  |
| <i>Z. Zeng, S. Kuroda, J. Kawakita, M. Komatsu, H. Era</i>                                                                                                                                              |      |
| Study of the Splat-Substrate Interface for a NiCr Coating Plasma Sprayed on to Polished Aluminum and Stainless Steel Substrates.....                                                                    | 974  |
| <i>S. Brossard, P.R. Munroe, A. Tran, M.M. Hyland</i>                                                                                                                                                   |      |
| Influence of Microstructure and Mechanical Properties on the Tribological Behavior of Flame Sprayed Al <sub>2</sub> O <sub>3</sub> -TiO <sub>2</sub> and WC-NiFeCr Coatings .....                       | 980  |
| <i>A.G. González, F. Vargas, M.E. López, A. Toro</i>                                                                                                                                                    |      |
| Influence of Powder Structure on the Micro-Hardness and Fracture Toughness of Cold-Sprayed WC-12Co Deposit .....                                                                                        | 986  |
| <i>P.-H. Gao, G.-J. Yang, C.-J. Li, C.-X. Li</i>                                                                                                                                                        |      |
| The Electrical and Mechanical Properties of Kinetic Sprayed Carbon Nanotube Aluminum Composite Coating .....                                                                                            | 992  |
| <i>K. Kang, Y. Xiong, C. Lee</i>                                                                                                                                                                        |      |
| Testing Method of Spalling Resistance for Thermal Barrier Coating by Thermal Cycle and Thermal Shock.....                                                                                               | 997  |
| <i>Y. Harada, Y. Itoh, Y. Kojima, F. Ono</i>                                                                                                                                                            |      |
| Phase Composition Changes of Plasma Sprayed TiO <sub>2</sub> Coatings Deposited Under Different In-Flight Temperatures and Velocities.....                                                              | 1002 |
| <i>J. Cizek, K.A. Khor</i>                                                                                                                                                                              |      |
| Effect of Powder Characteristics on Properties of Warm-Sprayed WC-Co Coatings.....                                                                                                                      | 1006 |
| <i>P. Chivavibul, M. Watanabe, S. Kuroda, M. Komatsu, K. Sato, J. Kitamura</i>                                                                                                                          |      |

|                                                                                                                              |      |
|------------------------------------------------------------------------------------------------------------------------------|------|
| Characterization of Residual Stresses in Al and Al-Al <sub>2</sub> O <sub>3</sub> Cold Sprayed Coatings .....                | 1012 |
| <i>S. Rech, A. Trentin, S. Vezzù, J.-G. Legoux, E. Irissou, B. Arsenault, M. Lamontagne, C. Moreau, M. Guagliano</i>         |      |
| The Effect of Heat Treatment on the Oxidation Mechanism of Blended Powder Cr <sub>3</sub> C <sub>2</sub> -NiCr Coatings..... | 1018 |
| <i>S. Matthews, B. James, M. Hyland</i>                                                                                      |      |
| A Comparative Study of the Isothermal Oxidation Behaviour of APS, VPS and HVOF CoNiCrAlY Coatings.....                       | 1024 |
| <i>M. Di Ferdinando, A. Fossati, A. Lavacchi, F. Borgioli, U. Bardi, C. Giolli, A. Scrivani, G. Rizzi</i>                    |      |
| High Temperature Behavior of Newly Developed Oxide Dispersion Strengthened NiCoCrAlY Coatings.....                           | 1030 |
| <i>K. Bobzin, T. Schläfer, K. Richardt, M. Brühl</i>                                                                         |      |
| Influence of the Substrate Hardness on the Rolling Contact Fatigue of WC-17%Co Hardmetal Coatings.....                       | 1036 |
| <i>L.-M. Berger, K. Lipp, U. May</i>                                                                                         |      |
| Development of Thermal Spray Coatings with Corrosion Protection and Antifouling Properties .....                             | 1041 |
| <i>K. Murakami, M. Shimada</i>                                                                                               |      |
| Densification of Atmospheric Plasma Sprayed Wear Resistant Coatings.....                                                     | 1045 |
| <i>W. Tillmann, E. Vogli, B. Krebs, A.E. Tekkaya, A. Brosius, V. Franzen</i>                                                 |      |
| Tribological Properties of HVOF Sprayed Tungsten Carbide Coatings After EDM Process .....                                    | 1052 |
| <i>W. Żórawski, N. Radek</i>                                                                                                 |      |
| Heat Flux Controls by in Situ Laser Treatment for Thermal Spraying .....                                                     | 1056 |
| <i>Y. Danlos, S. Costil, S. Deng, H. Liao</i>                                                                                |      |
| Effects of Heat Treatment on the Mechanical Properties of Plasma-Sprayed 316L Coatings .....                                 | 1062 |
| <i>B.-H. Tian, L. Chang, W.-L. Qu, Y. Gao</i>                                                                                |      |
| Cooling in Thermal Spraying – CO <sub>2</sub> and Its Advantages.....                                                        | 1067 |
| <i>W. Kroemmer, P. Heinrich</i>                                                                                              |      |
| Chemical Vapor Deposition and Atomic Layer Deposition of Coatings for Mechanical Applications .....                          | 1072 |
| <i>G.L. Doll, T.W. Scharf</i>                                                                                                |      |
| Polymer Thermal Spraying: A Novel Coating Process.....                                                                       | 1078 |
| <i>M. Ivosevic, S.L. Coguill, S.L. Galbraith</i>                                                                             |      |
| Ecodesign of Surface Coatings: How to Conciliate Environmental and Technical Performances? .....                             | 1084 |
| <i>N. Serres, F. Hlawka, A. Cornet, S. Costil, C. Langlade, F. Machi</i>                                                     |      |
| Three Years Corrosion Tests of Nanocomposite Epoxy Sealer for Metalized Coatings on the East China Sea.....                  | 1090 |
| <i>Y. Chun-long, A. Yun-qi, S. Ya-tan</i>                                                                                    |      |
| Internal Diameter Coating Production by Pulsed Gas Dynamic Spraying .....                                                    | 1094 |
| <i>B. Jodoin, M. Yandouzi</i>                                                                                                |      |
| HVOF and HVSFS Coatings for Reduction of Wear and Friction in Cylinder Liners .....                                          | 1100 |
| <i>J. Rauch, A. Manzat, A. Killinger, R. Gadow</i>                                                                           |      |

|                                                                                                                                                                |      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Recent Application of Thermal Spray to Thermal Power Plants .....                                                                                              | 1106 |
| <i>A. Notomi, N. Sakakibara, T. Torigoe</i>                                                                                                                    |      |
| Drag Reduction and Self-Cleaning of Thermal Sprayed Surfaces by the Combination of Materials<br>with Positive and Negative Thermal Expansion Coefficients..... | 1112 |
| <i>J. Wilden, S. Jahn, V.E. Drescher, P. Schaaf</i>                                                                                                            |      |
| External Ballistics of Powder Under Detonation Spraying .....                                                                                                  | 1117 |
| <i>V. Ulianitsky, A. Shtertser, D. Pervushin, I. Smurov</i>                                                                                                    |      |
| Electric Characteristics of Plasma Arc Produced by Bi-Anode Torch.....                                                                                         | 1122 |
| <i>L.T. An, Y. Gao</i>                                                                                                                                         |      |
| MMCs Coatings with High SiC Volume Fraction Retention by Pulsed-Gas Dynamic Spraying.....                                                                      | 1128 |
| <i>M. Yandouzi, P. Richer, B. Jodoin</i>                                                                                                                       |      |
| Remelting of Flame Spraying PEEK Coating Using Lasers .....                                                                                                    | 1134 |
| <i>A. Soveja, S. Costil, H. Liao, P. Sallamand, C. Coddet</i>                                                                                                  |      |
| Feather-Like Structured YSZ Coatings at Fast Rates by Plasma Spray Physical Vapor Deposition .....                                                             | 1140 |
| <i>A. Shinozawa, K. Eguchi, M. Kambara, T. Yoshida</i>                                                                                                         |      |
| Metal and Non-Metal Film Formation Using Atmospheric Aerosol Spray Method.....                                                                                 | 1146 |
| <i>H. Choi, K. Kim, T. Kim, H. Choi</i>                                                                                                                        |      |
| Cold Spraying Combined with Laser Surface Pre-Treatment Using Protal.....                                                                                      | 1151 |
| <i>D.K. Christoulis, S. Guetta, V. Guipont, M.H. Berger, M. Jeandin, M. Boustie, S. Costil, Y.<br/>Ichikawa, K. Ogawa, E. Irissou, J.-G. Legoux, C. Moreau</i> |      |
| Laser Remelting Modification of HVOF Sprayed WC-Based Cermet Coatings.....                                                                                     | 1157 |
| <i>X.H. Tan, J.S. Sun</i>                                                                                                                                      |      |
| Wear and Corrosion Behavior of HVOF-Sprayed WC-CoCr Coatings on Al Alloys.....                                                                                 | 1163 |
| <i>G. Bolelli, L. Lusvarghi, M. Barletta, V. Karhail</i>                                                                                                       |      |
| Studies on the Sliding Wear Performance of Plasma Spray Ni-20Cr and Ni <sub>3</sub> Al Coatings .....                                                          | 1169 |
| <i>M. Kaur, H. Singh, B. Singh, B. Singh</i>                                                                                                                   |      |
| Characterization of Boron Carbide Thermal Sprayed Coatings for High Wear Resistance<br>Performance.....                                                        | 1175 |
| <i>M. Rosales, F. Camargo, C.R.C. Lima</i>                                                                                                                     |      |
| High Performance – Low Costs: Iron Based Coatings with Improved Microstructures for Wear and<br>Corrosion Applications.....                                    | 1178 |
| <i>K. Bobzin, T. Schläfer, K. Richardt, T. Warda</i>                                                                                                           |      |
| Wear Behavior of Plasma Sprayed Al-Si/TiB <sub>2</sub> /h-BN Composite Coating .....                                                                           | 1183 |
| <i>I. Ozdemir, Y. Tsunekawa, C. Tekmen, T. Grund, B. Wielage</i>                                                                                               |      |
| Coatings for Polymer Turbine Blades .....                                                                                                                      | 1189 |
| <i>S. Dixit, M. Chin, R. Dixit</i>                                                                                                                             |      |
| Comparison of Nanometric and Micrometric Alumina Coatings on Wear Resistance .....                                                                             | 1195 |
| <i>H. Ageorges, R. Vert, G. Darut, F. Zishuan</i>                                                                                                              |      |
| The Effect of Toughness on Wear Resistance of Alumina-Titania Coatings Obtained by APS.....                                                                    | 1201 |
| <i>F. Vargas, M.E. López, H. Ageorges, P. Fauchais</i>                                                                                                         |      |

|                                                                          |      |
|--------------------------------------------------------------------------|------|
| LCA Comparison of Electroplating and Other Thermal Spray Processes ..... | 1207 |
| <i>A. Moign, A. Vardelle, J.G. Legoux, N.J. Themelis</i>                 |      |
| Thermal Spray Process Training – a New Perspective .....                 | 1213 |
| <i>J.P. Sauer, M. Carroll</i>                                            |      |

## **Author Index**