

# **Symposium on Advanced Materials**

Selected peer-reviewed extended articles  
based on papers presented at the  
17<sup>th</sup> International Symposium on  
Advanced Materials (ISAM-2021)

Aggregated Book

*Edited by*

**Dr. Amjad Ali, Dr. Syed Khalid Shah,  
Muhammad Saleem and Tahir Ikram**



**Copyright** © 2022 Trans Tech Publications Ltd, Switzerland

All rights reserved. No part of the contents of this publication may be reproduced or transmitted in any form or by any means without the written permission of the publisher.

Trans Tech Publications Ltd  
Seestrasse 24c  
CH-8806 Baech  
Switzerland  
<https://www.scientific.net>

Volume 23 of  
*Scientific Books Collection*  
ISBN 978-3-0357-1316-9

Full text available online at <https://www.scientific.net>

**Distributed worldwide by**

Trans Tech Publications Ltd  
Seestrasse 24c  
CH-8806 Baech  
Switzerland  
Phone: +41 (44) 922 10 22  
e-mail: [sales@scientific.net](mailto:sales@scientific.net)

**Printed with permission by**  
Curran Associates Inc. (2023)

CURRAN ASSOCIATES INC.  
**proceedings**.com

Additional copies of this  
publication are available from:

Web: [www.proceedings.com/68411.html](http://www.proceedings.com/68411.html)

## Table of Contents

<b>Preface</b>	v
<b>ISAM 2021 Committees, Sponsors</b>	vi
<b>Chapter 1: Corrosion Behaviour of Materials and Corrosion Protection</b>	
<b>Corrosion Inhibition of Low Carbon Steel in Soil Solutions, Using Novel Schiff Base Inhibitor</b>	
M. Faryal, M. Uzman, M. Shahid and M. Arfan .....	3
<b>Corrosion Behavior of MoSi<sub>2</sub> Coated Hastelloy X Utilized in Iodine -Sulfur Cycle for Hydrogen Production Application</b>	
Z. Hussain, Z. Khan, A. Ali, N. Ahmad, W. Qasim and A. Shabbir .....	12
<b>Oxidation Resistant Nickel Aluminide Coating on Niobium Alloy C103 for High Temperature Aerospace Applications</b>	
N. Zubair, N. Ejaz and M. Mansoor.....	19
<b>Synthesis of Nano Ceramic Epoxy Hybrid Composite Coating on Metallic Substrate for Corrosion Protection</b>	
W. Shehzad, E. Ul Haq, M.R. Abdul Karim, J. Shehzad and H. Sabtai .....	25
<b>Chapter 2: Materials Failures and Damage Analysis</b>	
<b>Pole Figure Analysis of Graphite Material</b>	
T. Anis, H. Waqas, Z. Asghar, S.Z. Hussain, S. Naz, M. bin Ahmed, T.A. Khan and F. Khan .....	39
<b>Investigation of Cracks on Internal Surfaces of Extruded Cold Worked Thick Walled Pipes of an Age Hardened Al-Alloy</b>	
I. Jahangir, H. Naeem, A. Faheem and A. Tauqir.....	45
<b>Analysis of Malfunctioning of Centrifugal Compressor of Starter Engine of an Aircraft</b>	
N. Ejaz and M. Mansoor .....	52
<b>Impurity Driven Embrittlement in AISI 1020 Steel during Thermal Treatments</b>	
M. Mansoor, N. Zubair and N. Ejaz.....	59
<b>Case Study of PVC Cables Exposed in Accelerated Thermal and Radiation Environment</b>	
H. Waqas, S. Naz, T.A. Khan, M. bin Ahmed and F. Khan .....	66
<b>Eutectic Si Accumulation in Liquid Forged A356 Alloy Wheel and its Adverse Effect on Tensile Fracture Behavior</b>	
H. Mudassar, M.W. Liu, C. Xu, S. Handa, H. Yamagata and C.L. Ma.....	74
<b>Numerical Simulation of Viscosity Effects on Carbon Steel 90° Elbow Erosion due to Sand-Liquid Flow</b>	
R. Khan, H. Ya, M. Azad Alam, M. Azeem, T. Ahmed, M. Rameez and U. Niazi .....	83
<b>Vibrational Fatigue of Fuel Pipe Welds of an Aero Engine</b>	
M. Nazir, N. Ejaz and M. Mansoor.....	91

**Aging Assisted Failure of SV-40 Epoxy**

M. Nazir, N. Ejaz and M. Mansoor..... 96

**Chapter 3: Composites****Shape Memory Hybrid Composites for Aerospace Applications**

H. Ozair, A.A. Khurram, A.U.H. Baluch, A. Wadood and I. Qazi..... 103

**Advanced Body Armor Utilizing Shear Thickening Fluid Based on Nanosized Silica Particles**

M. Saleem, A. Ali, S.K. Shah and M. Shuaib..... 111

**Design and Analysis of Multi-Layered Composite Panels for In-Plane Loadings**

O.A. Ahmed Awan, B. Saeed, M.A. Shehzad and M.A. Khan ..... 119

**Development of Auxetic Braided Yarns and Study the Effects of Braid Angle and Material Modulus on the Negative Poisson's Ratio**

A. Ali Shah, M. Shahid, N.A. Siddiqui and Y. Nawab..... 129

**Design of Experiments for Green Tire Tread Compound Development by Reducing Conventional Carbon with an Eco-Friendly Filler**

M. Sohail, S.U. Athar, H. Siddiqui, A. Sohail, A. Raza, M. Sarwar and M. Farooq..... 139

**Effect of Carbon Nanotubes Addition on the Formability of Al-CNT Composite**

M. Mansoor, M. Shahid and N. Ejaz ..... 147

**Chapter 4: Functional Ceramics****Study of Temperature Dependent Dielectric Spectroscopy of Cerium Doped Bismuth Calcium Cobaltite**

Y. Abbas, M. Kamran, T. Akhtar and M. Anis-ur-Rehman ..... 159

**Electrical Study of PVP/LiCo<sub>1-x</sub>Zn<sub>x</sub>O<sub>2</sub> Nanoparticles Embedded Nanofibers**

S. Nawaz Malik and M. Anis-ur-Rehman..... 166

**Cost-Effective Synthesis of Cobalt Ferrite Nanoparticles by Sol-Gel Technique**

M. Abdullah, S. Hasany, M. Amir Qureshi and S. Hussain ..... 173

**Effect of Sn Content on Structure and Piezoelectric Properties of Pb(Zr<sub>0.35</sub>Ti<sub>0.65</sub>)<sub>1-x</sub>Sn<sub>x</sub>O<sub>3</sub>**

H. Haroon, Z. Sarfraz, M. Shuaib, M. Saleem, A. Rauf, N. Abbas and M. Luqman ..... 180

**Effect of Boron Oxide Addition on Microstructure and Mechanical Properties of Slip Cast Fused Silica**

N. Abbas, M. Luqman, A. Rauf, M. Shuaib, H. Haroon, S.K. Shah and M. Saleem ..... 186

**Synthesis and Characterization of Nd-Doped Calcium Bismuth Cobaltites for Thermoelectric Applications**

H. Farooq Kiani and M. Anis-ur-Rehman ..... 191

**Study of Structural and Electrical Properties of CuFe-CGN for Renewable Energy Applications**

A. Siddique and M. Anis-ur-Rehman ..... 198

**Structural and Electrical Properties of Pure and Samarium Doped MgFe<sub>2</sub>O<sub>4</sub> Nanoparticles for Resistive RAM Applications**

H. Mazhar and M. Anis-ur-Rehman ..... 205

**Electrical Properties of Lanthanum Doped Cobalt Ferrite Nanoparticales**

M. Kamran, Y. Abbas, T. Akhtar and M. Anis-ur-Rehman ..... 212

---

<b>Structural and Electrical Properties of Rare Earth/ Ferrites: Studied for Resistive Switching Device Application</b>	R. Khan and M. Anis-ur-Rehman .....	218
<b>A Comparison of the Electrical Properties of Co-doped Ceria and Tri-Doped Ceria for Energy Applications</b>	S. Javed, S. Gul-e-Rana and M. Anis-ur-Rehman .....	225
<b>Chapter 5: Materials for Photovoltaics and Optoelectronics</b>		
<b>Preparation Structural and Optical Analysis of Tungsten Sulphide (WS<sub>2</sub>) Thin Film by DC-Sputtering</b>		M.F. Ali Mehdi, S.S. Hussain and S. Riaz.....
		233
<b>Green Up-Conversion Luminescence in Yb/Er Co-Doped AlN Thin Film by RF Magnetron Sputtering</b>		S.S. Hussain, M. Khan, G.A. Nowsherwan, M.S. Munir, S. Riaz, S.M. Hussain and S. Naseem.....
		239
<b>Photoluminescence Study of Silver Nanoparticles Decorated on Multiwall Carbon Nanotubes (MWCNTs) by Spectroflurometer</b>		M.S. Munir, A.A. Khan, M. Khan, G.A. Nowsherwan, S.S. Hussain, S. Riaz, M.A. Raza and S. Naseem .....
		247
<b>Diamond-Like Carbon Film Deposited via Electrochemical Route for Antireflection Applications in Photovoltaic</b>		A. Shabbir, Z. Khan, A. Ali, W. Qasim, N. Ahmad, Z. Hussain and H. Pervaiz .....
		256
<b>Development of 2nd Generation Thin Film Photovoltaics Based on CZTS Absorber Layer and ZnS Window Layer</b>		M. Tufail, S.S.A. Shah, Z. Khan and M.B. Ihsan .....
		269
<b>Optimizing the Morphology, Structure and Optoelectronic Properties of Aluminum Doped Zinc Oxide Thin Films Developed via Wet Chemical Synthesis</b>		M.M. Ur Rehman, Z. Khan, M. Ahmad, A. Ali and S. Aslam .....
		275
<b>Highly Transparent N-Type TiO<sub>2</sub> Coatings for Self-Cleaning Glass Application</b>		M. Rabeel, R. Khan, U. Ali, S. Javed and M.A. Akram.....
		282
<b>DFT Calculations Using Quantum ESPRESSO for Optical and Electronic Properties of Si Crystal</b>		M.H. Bashir, M. Sohail, S.M. Ul Hassan and T. Nawaz .....
		289
<b>Electrospinning of Cu Doped TiO<sub>2</sub> Nanofibers and their Potential Application in Photoanode of Dye-Sensitized Solar Cells</b>		W. Qasim, Z. Khan, A. Satti, A. Ali, A. Shabbir and Z. Hussain.....
		297
<b>A Study of Aluminum Doped ZnO Thin Films Developed via a Hybrid Method Involving Sputter Deposition and Wet Chemical Synthesis</b>		M. Ahmad, Z. Khan, M.M. Ur Rehman, A. Ali and S. Aslam .....
		304
<b>Photoluminescence Comparison of Different Substrates on AlN: Cr Thin Films for Optoelectronic Devices</b>		S.S. Hussain, A.S. Jawaid, N.U. Huda, M. Khan, G.A. Nowsherwan, S. Riaz, S.M. Hussain and S. Naseem .....
		311
<b>Near UV and Visible Region Photoluminescence Curves Study for AlN Thin Film and AlN Nanopowder</b>		S.S. Hussain, N.U. Huda, A.S. Jawaid, R. Arooj, M. Khan, Z. Fatima, N.U. Rehman, Q. Iqbal, R. Ali, S. Riaz and S. Naseem .....
		318

**Spectral Splitting Optimization for Highly Efficient Hybrid Photovoltaic Devices by Using Na<sub>3</sub>AlF<sub>6</sub>, Y<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub> Beam Splitter**

S.H. Faiza, G.A. Nowsherwan, M. Khan, M. Azhar, I. Ahmad, A. Zaib, S.S. Hussain, S. Riaz and S. Naseem ..... 324

**Chapter 6: Materials for Biomedical and Environmental Engineering Applications****Effect of Sericin Additive on Cellulose Acetate Membrane Morphology and Protein Rejection**

H. Waheed and A. Mukhtar ..... 335

**Synthesis and Characterization of Silica Coated Magnetite Nanoparticle Clusters for Viral RNA Extraction**

S. Zaman, I. Nazir, Z. Khattak, R. Abbasi and A. Ali ..... 341

**Fabrication and Pulse Sequences Evaluation of Iron Oxides Nanoparticles as MRI Contrast Agent**

M.A. Javid, H.M.W. Afzal, S. Khan, S.A. Buzdar and M. Nadeem ..... 348

**Synthesis of Silver Nanoclusters from *Melia azedarach* and their Usage for Catalytic Degradation of Variable Organic Dyes**

W. Munib ..... 358

**Keyword Index** ..... 363

**Author Index** ..... 367