IS&T/SPSTJ International Symposium on Silver Halide Imaging 2000

"Silver Halide in a New Millennium"

Sainte-Adele, Quebec, Canada 11-14 September 2000

ISBN: 978-1-62276-635-2

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[©] (2000) by the Society for Imaging Science & Technology All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact the Society for Imaging Science & Technology at the address below.

Society for Imaging Science & Technology 7003 Kilworth Lane Springfield, Virginia 22151

Phone: 703-642-9090 Fax: 703-642-9094

info@imaging.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: 845-758-2634 Email: curran@proceedings.com Web: www.proceedings.com

Table of Contents

iii
iv
V
vi
1
7
291

Thank You AgX 2000 Sponsors

Adobe Corporation Agfa-Gevaert Group Applied Science Fiction, Inc. Eastman Kodak Company Fuji Photo Film Co., Ltd. Hewlett-Packard Company Kodak Polychrome Graphics Konica Corporation Lexmark International, Inc. Polaroid Corporation Xerox Corporation 2000 International Symposium on Silver Halide Technology

The Papers Program

Monday, September 11, 2000

8:00 to 10:15 a.m.

Plenary Session

Session Co-Chairs: Tadaaki Tani, Fuji Photo Film Co., Ltd.; Gary House, Eastman Kodak Company

8: 00 a.m.	Opening Remarks and IS&T Honors and Awards	
8:10 a.m.	New Pathways in Silver Halide Imaging	1
	James Rodgers, Eastman Kodak Company	
8:50 a.m.	Activity in Silver Halide Technology and its Contribution	3
	Shunji Takada, Fuji Photo Film Co., Ltd.	
9:30 a.m.	From East-West 1 to East-West 5, From Micro- to Molecular-	4
	Engineered Material Design: The Past and the Future of	
	AgX-Imaging Systems Rene De Keyzer, Agfa-Gevaert N.V.	
	10:10 to 10:25 a.m. Coffee Break	
	10:25 - 10:55 a.m. Plenary Panel Q & A	
	10:55 a.m. to 12:10 p.m.	
	Session 1—Silver Halide's Role in Future Imaging Systems	
	Session Co-Chairs:	
	Tom Brust, Eastman Kodak Company;	
	Shunji Takada, Fuji Photo FilmCo., Ltd.	
10:55 a.m.	Film Capture for Digitization	7
	Allan F. Sowinski, Lois A. Buitano, Steven G. Link and Gary L. House,	
	Eastman Kodak Company	
11:20 a.m.	Film As the Archival and Entertainment Medium of the 21st Century	13
	Harry A. Shamir, ColorCode UnLimited Corp.	
11:45 a.m.	Silver Halide and Silicon as Consumer Imagers	16
	Richard Szajewski, Eastman Kodak Company	

12:10 to 1:15 p.m. Lunch Break

1:15 to 5:20 p.m. Session 2—Advances in AgX Emulsion Design and Characterization Session Co-Chairs:

Silvia Karthäuser, Agfa-Gevaert AG; Jeff Hansen, Eastman Kodak Company

1:15 p.m.	Kinetics of Silver Halide Conversion Bruce E. Kahn, Joaquin Calcines, Heather M. Dolan, Kristyn R. Falkenstern, Conor D. Kelly, Erin P. Murphy, A. Gary DiFrancesco and Richard K. Hailston Rochester Institute of Technology	20 ne,
1:40 p.m.	Crystal Growth Control of (100)-AgCl-Tabular-Grains Silvia Karthäuser, Agfa-Gevaert AG	25
2:05 p.m.	Variation in Silver Chloride Morphology as a Function of Silver Iodide Impurity Level Thomas B. Brust and Yun C. Chang, Eastman Kodak Company	27
2:30 p.m.	A Study of Structure and Property of Hollow Silver Halide Microcrystal Emulsions Kai Huang, Jinpei Li and Sue Wang, Institute of Photographic Chemistry, P.R. China	31
	2:55 to 3:15 p.m. Coffee Break	
3:15 p.m.	Atomic Force Microscopy Study on the Surface of Silver Halide Microcrystals Katsuhiko Suzuki and Sadayasu Ishikawa, Konica Corporation	35
3:40 p.m.	Defect Induced Thickness Growth in Silver Chloride (111) Tabular Crystals: A TEM Study W. Van Renterghem, D. Schryvers and J. Van Landuyt, University of Antwerp; D. Bollen, C. Van Roost and R. De Keyzer, Agfa-Gevaert, N.V.	38
4:05 p.m.	Influence of the Aspect Ratio of Tabular Grains on the Light Scattering <i>Thomas Müssig, Agfa Gevaert AG</i>	44
4:30 p.m.	A Balanced Nucleation and Growth Model for Controlled Precipitations Ingo H.Leubner, Crystallization Consulting	49

4:55 p.m.	Investigation of Kinetics of Recrystallization of Silver Halide Microcrystals By A Turbidimetric Method	54
	Timothy A. Larichev and Elena N. Dyudyaeva, State Univ. of Kemerovo;	
	M. Y. Young and Hong C. Ahn, Korea Research Institute of Chemical Technology	ology
	7:30 to 9:30 p.m Dinner Break	
	Tuesday, September 12, 2000	
	8:00 to 9:40 a.m.	
	Session 3 — AgX Photophysics and Latent Image Formation	
	Session Co-Chairs:	
	Mitsuo Kawasaki, Univ. of Kyoto; Myra Olm, Eastman Kodak Company	
8:00 a.m.	Quantum-Sized Silver, Silver Chloride and Silver Sulfide Clusters Gion Calzaferri, Dominik Brühwiler, Stephan Glaus, David Schürch,	59
	Antonio Currao, University of Bern, Switzerland	
8:25 a.m.	Characterization of Ag Clusters Formed on AgBr Grains By	63
	Light and Reduction in Terms of Kubo Effect	
	Tadaaki Tani and Toshio Tsukada, Fuji Photo Film Co., Ltd.	
8:50 a.m.	Transition Metal Dopants With Unusual Ligands	66
	M. T. Olm, R. S. Eachus, W. G. McDugle, R.C. Baetzold	
	Eastman Kodak Company	
9:15 a.m.	Electron Transfer in Solid State Materials I	71
	Sanford H. Ehrlich, Consultant	

9:40 to 10:00 a.m. Coffee Break

10:00 a.m. to 12:30 p.m. Session 4—Chemical and Spectral Sensitization Session Co-Chairs: Kathy Elst, Agfa Gevaert; Deyin Huang, Shanghai Jiao Tong University

82

10:00 a.m.	Computational Study of Sulfur Sensitizing Centers on AgBr
	Roger C. Baetzold, Eastman Kodak Company

10:25 a.m.	Determination of The Silver Sulphide Cluster Size Distribution via Computer Simulations	85
	E. Charlier and R. Gijbels, Univ. of Antwerp;	
	M. Van Doorselaer and R. De Keyzer, Agfa Gevaert, N.V.	
10:50 a.m.	Imaging Cyanine Dye Aggregates on Silver Halide Emulsion Grains with Atomic Force Microscopy	90
	Jeffrey C. Hansen, Joe E. Maskasky, Kevin W. Williams, Eastman Kodak Company	
11:15 a.m.	Direct Observation of Reversible and Irreversible Oxidation of Layered J-Aggregate Supported Above Au(111)	95
	Mitsuo Kawasaki and Tomoo Sato, Kyoto University	
11:40 a.m.	Sensitization and Stabilization of AgCl Tabular Crystals Having	99
	Low Iodide Content	
	Kathy Elst and P. Verrept, Agfa Gevaert N.V.	
12:05 p.m.	Synthesis and Properties of Some Pyrylium-Squarylium	102
	Cyanine Dyes	
	Jianguo Chen and Deyin Huang, Shanghai Jiao Tong University	
	12.20 to 2.20 mm Lunch Presh	
	12:50 ю 2:50 р.т. Цинсп Бгеак	

2:30 to 5:30 p.m. - Afternoon Free for Networking

Tuesday Evening 5:30 to 7:30 p.m. September 12, 2000

The Poster Session

Session Chair: Melville R. V. Sahyun, University of Wisconsin

Crystallization and Photographic Properties of Heterocontact AgBr/AgCl	106
Microcrystals	
Boris Sechkarev, Larisa Sotnikova, Fyodor Titov, T. Larichev, Tanya Ignatieva and	
Alex Utechin, State Univ. of Kemerovo	

Spectral Sensitization of Microcrystals a Core-Shell with the Inner Centers	109
of a Photosensitivity	
B. Sechkarev, L. Sotnikova, Marina Ryabova, T. Ignatieva and A. Utechin,	

State University of Kemerovo

Structural Characterization of Microscopic Defects in (111) AgBrI Microcrystals: Correlation of Stacking Fault Defects to Twin Boundary Morphology <i>Samuel Chen, A. E. Taddei, S. Jagannathan, and M. G. Antoniades,</i> <i>Eastman Kodak Co.</i>	112
Features of AgHal Crystals Photolysis Lidiya Novikova and Oksana Esipenko, Kemerovo State University	116
Photosensitivity of Nanoparticle Silver Halide Dispersions in Fish Gelatin Shuxin Tan, Jun Yue, Bixia Huang, Sunwen Liu and Lei Song, University of Science and Technology of China	118
Characteristics of Some Derivatives of Tetraazaindene Yuan Li, Xiaohui Liu and Deyin Huang, Shanghai Jiao Tong University; Baozhu-Zou Tian, Jing Zhou, Shouyong Ren and Dade Zhang, Lucky Film Co., Ltd.	123
Photoelectrochemical Water Splitting with AgCl as Photoanode? <i>Gion Calzaferri, David Schürch, Stephan Glaus and Antonio Currao, University of Berne</i>	127
Coagulation Mechanism of Nucleation of Tabular Microcrystals at Double-Jet Crystallization <i>A. G. Kotov, Scientific Centre Niikchimphotoproekt and A. V. Medvedeva, FoMos PLC</i>	128
Interaction Dye-Dye on a Surface of AgHal T-Grains A. A. Fadeev, FoMos PLC and B. I. Shapiro, Scientific Centre Niikchimphotoproekt	132
 Phase-Transfer Catalysis in Black and White Development With Hydrophobic DIR-Compounds T. D. Blinova, L. Y. Kaplun, S. A. Danshin, B. I. Shapiro, Russian Association of Scientific and Applied Photography 	136
Attainable Speed Limits: Effect of The Electrical and Heat Fields on the Photolysis of AgHal Systems Yuri Breslav, Michael Ushomirsky, Boris Borshevsky and Anatoli Heinman, Russian Society of Photographic Science and Technology	137
Nuclei of Critical Size and Silver Surface Tension V. Zakharov and Y. Fedorov, Moscow State University	141
Effect of Several Inhibitors on Contrast of Silver Halide CTP Printing Plate <i>Xiujie Hu, Shuyun Zhou and Ping Chen, Institute of Photographic Chemistry, China</i>	144
Feature of Emulsion Ripening with Octahedral Habit Microcrystals <i>I. L. Kolesnicova, N. S. Zvidentsova and S. A. Sozinov, Kemerovo State University</i>	148

Tabular Crystals Formation in Presence of Sulfonic Compounds J. Spirina, S. Shaikhulina, M. Popova, Kemerovo State University	*
Laminated Tabular AgBrI Grains With Gradually Varied Iodide Distribution S. Shaikhulina, E. Terentiev and J. Spirina, Kemerovo State University	152
Sensitometric Effect of Pre-exposure Heating on Thermally Developed Photographic Materials	155
<i>Fluorescence Dynamic Studies of Cyanine Dyes in Gel-Dried Film and</i> <i>Liquid Emulsion By Femtosecond Fluorescence Up-Conversion Technique</i> <i>J. W. Oh, K. Ebina, I. V. Rubtsov and K. Yoshihara, Japan Advanced</i> <i>Institute of Science and Technology; T. Suzumto and T. Tani, Fuji Photo Film Co., Ltd.</i>	157
Preparation of Gold Clusters Dispersed in Gelatin Layer in Using Photographic Film(4): Effect of Emulsion Characteristics Ken-Ichi Kuge, Michiko Arisawa, Ken-Ichi Kimijima, Tadayuki Shinozawa, Naokazu Aoki and Akira Hasegawa, Chiba University	160
Photochromic Gel Valery Zakharov, Nikolay Alekhin and Leonid Aslanov, Moscow State University	164
A Photographic Film With Reversed Microemulsions of Silver Halide <i>Chun-Yan Liu, Zhi-Ying Zhang, Institute of Photographic Chemistry, Chinese</i> <i>Academy of Sciences</i>	166
Influence of Crystalization Rate on Structure of AgBr Emulsion Microcrystals Sergey Sozinov and Irina Kolesnikova, Kemerovo State University	168
Photoinitiated Silver Cluster Formation in Agbr Nanocrystals S. B. Brichkin, V. F. Razumov, M. G. Spirin, Inst. of Problems of Chemical Physics, Russian Acad. of Science	*
Influence of the Precipitation Method on Defect Formation in Multishell AgBrI (111) Tabular Crystals W. Van Renterghem, D. Schryvers and J. Van Landuyt, EMAT, University of Antwerp; S. Karthäuser, R. De Keyzer and C. Van Roost, Agfa-Gevaert N.V.	170
Functioning of Thiocyanate Ions During Sulphur and Sulphur-Plus-Gold Sensitization E. Charlier and R. Gijbels, University of Antwerp, Belgium; M. Van Doorselaer and Rene De Keyzer, Agfa-Gevaert, N.V.	175
Formation of Monodisperse Hexagonal Tabular Microcrystals During Growth of AgBr(I) Lateral Shells on an AgBr Core T. A. Larichev, State University of Kemerovo; T. S. Kang, M. Y. Youn and H. C. Ahn, Korea Research Institute of Chemical Technology	180

The Exchange of Fluorinated Dyes Between Different Types of Silver Halide Microcrystals Studied By Time of Flight Secondary Ion Mass Spectrometry (TOF-SIMS <i>Jens Lenaerts, G. Verlinden and Renaat Gijbels, University of Antwerp;</i> <i>Ingrid Geuens and Paul Callant, Agfa-Gevaert N.V.</i>	183 S)
Models for the Kinetic of Photoelectrons in AgX-Sensors Depending on the Temperatur O. Schroder, Ch. Jenisch, H. Fuess, Th. Müssig, Inst. Fur Angewandte Physik	'е *
A False-Sensitized Instant Film for LED Printers Zbigniew J. Hinz and Michael P. Filosa, Polaroid Corporation	187
The Influence of Iodide Distribution on the Kinetics of Photocharge Carriers in Tabular Crystals Silvia Karthäuser and Thomas Müssig, Agfa-Gevaert AG; C. Jenisch, TUD, FB-Materialwissenschaften; D. Wilken, Institut für Organische Chemie, Martin Luther Universität	190
Observation and Analysis of Sulfur Sensitization Centers Formed on Octahedral Silver Bromide Grains <i>Hiroyuki Mifune, Masafumi Mizuno. Yoshiaki Toyama, Takefumi Shiozawa and Jun Okuda,</i> <i>Fuji Photo Film Co., Ltd.</i>	193
Electron and Hole Dynamics By Microwave Detected Photoconductivity Transients of AgBr_{1-x} I _x-Tabular Crystals <i>T. Hahn, J. Niklas, Technical University of Bergakademie Freiberg;</i> <i>Thomas Müssig, Agfa Gevaert AG</i>	197
The Logistic Imitation of the Color Photosensitive Materials D-T Curve and the Estimation to its Parameter <i>Li-Chang Han, Col. of Urban and Environmental Sciences, Northeast Normal Univ. China</i>	*
Semi-Hollow Silver Halide Crystals Containing High-Iodide Content Xu Yong-En, Institute of Photographic Chemistry, Academia Sinica, China	200
A Plate-set Silver Bromoiodide Grain Xue-Fu Cui, Institute of Photographic Chemistry, Chinese Academy of Sciences	203

7:30 to 9:30 p.m. - Dinner Break

Wednesday, September 13, 2000 8:00 a.m. to 12:30 p.m. Session 4 Continued — Chemical and Spectral Sensitization

Session Co-Chairs: Kathy Elst, Agfa Gevaert; Deyin Huang, Shanghai Jiao Tong University

8:00 a.m.	Ultrafast Dynamics of Spectral Sensitization Keitaro Yoshihara, Koujiro Ebina and S. Kumazaki Japan Advanced Institute of Science and Technology; Takeshi Suzumoto and Tadaaki Tani, Fuji Photo Film Co., Ltd.; Igor V. Rubtsov, Institute for Chemical Physics Research, Russia	205
8:25 a.m.	Recent Advances in the Photochemistry of Cyanine Dyes <i>M. R. V. Sahyun, University of Wisconsin, Eau Claire</i>	208
8:50 a.m.	Influence of Molecular Arrangements on the Properties of Polymethine Dye Aggregates Takashi Katoh, Keizo Ogawa, and Yoshio Inagaki, Fuji Photo Film Co.,Ltd.; Renji Okazaki, Japan Women's University	211
9:15 a.m.	Design and Principles of Two-Electron Sensitization By Fragmentable Electron Donors Annabel Muenter, Jerry Lenhard, Samir Farid, Ray Eachus, Steve Godleski, Paul Zielinski, Eastman Kodak Company; Ian Gould, Arizona State University 9:40 to 10:00 a.m. Coffee Break	215
10:00 a.m.	Measurement and Analysis of Adsorbed Amount of a Sensitizing Dye on Each AgBr Grain By Microscope Spectroscopy Katsuhiro Yamashita, Fuji Photo Film Co. Ltd.; Asanuma Hiroyuki, University of Tokyo	220
10:25 a.m.	Supramolecular Architectures of Spectral Sensitizers in Two and Three Dimensions P. Callant and G. Deroover, Agfa-Gevaert N.V.	224
10:50 a.m.	Effects of Iridium Doping and Chemical Sensitization on Reciprocity Law Failure and Latent Image Stability Masanobu Miyoshi, Shuji Murakami, Koichiro Kuroda, Konica Corporation	225
11:15 a.m.	Effect of Iridium Doping in Cubic and Octahedral AgBr Grains on the Latent Image Formation Process <i>M. Slagt, Y. Iwasa, Fuji Photo Film, BV; T. Owaki and A. Hirano,</i> <i>Fuji Photo Film Co. Ltd.</i>	227

11:40 a.m.	Study of Size-Selection and Ionic Deposition of Silver Sulfide Sensitization Clusters on AgBr Microcrystals Xiang Zhao, Weidong Cui and Bixian Peng, Institute of Photographic Chemistry, Chinese Academy of Sciences; Peng Liu, Chunying Han, Zhen Gao, Qihe Zhu and Fanao Kong, State Key Laboratory of Molecular Reaction Dynamics, Institute of Chemistry, Chinese Academy of Sciences	233
	12:05 to 1:30 p.m. Lunch Break	
Jame	1:30 to 5:35 p.m. Session 5 — Photothermographic Technology and Systems Session Co-Chairs: s Reynolds, Eastman Kodak Company; Yoshihiko Suda, Konica Corporation	
1:30 p.m.	Thermal Behaviour of Silver Behenate-Based Dry Processable Image-Forming Materials <i>Ingrid Geuens, Agfa Gevaert N.V.;</i> <i>Iris Vanwelkenhuysen and Renaat Gijbels, University of Antwerp</i>	236
1:55 p.m.	Numerical Model for Characteristic Curves of Photothermographic Materials Using Semiempirical Simulation Method Tsukasa Ito, Shu Nishiwaki and Tsuyoshi Mitsuhasi, Konica Corporation	240
2:20 p.m.	The Reaction Mechanism of Thermally Developed Photographic System Based on Silver Carboxylate <i>T. Maekawa, M. Yoshikane, H. Fujimura and I. Toya,</i> <i>Fuji Photo Film Co., Ltd.</i>	245
2:45 p.m.	Atomic Force Microscopy, Far-Field and Near-Field Fluorescence Microscopy, Three Complementary Techniques to Visualize the Spatial Distribution of Behenic Acid Lieve Bastin, Christian Catry, Iris Cuppens, Karin Jeuris, Carine Jackers and Frans De Schryver, Catholic University of Leuven; Frank Ruttens, Agfa-Gevaert N.V.	249

3:10 to 3:30 p.m. Coffee Break

3:30 p.m.	The Meaning of Catalytic Contact Or Close Proximity Between Silver Halide and Organic Silver Salt in Photothermographic Materials <i>Hans Strijckers and Chris Van Roost, Agfa Gevaert N.V.</i>	254
3:55 p.m.	Autocatalytic Formation of Silver Particles During Photographic Development <i>K. Winkelmann and G. Mills, Auburn University</i>	257
4:20 p.m.	On the Role of Microcrystalline Silver Bromide in the Development Process of Photothermally Developed Materials of the "Dry Silver" Type Yu. E. Usanov, State Optics Institute, Russia	261
4:45 p.m.	The Formation of Silver Particles During the Decomposition of Long Chain Silver Carboxylates <i>B. Bokhonov, Institute of Solid State Chemistry;</i> <i>Yu. Usanov, Vavilov State Optical Institute, Russia;</i> <i>L. Burleva and D. R.Whitcomb, Eastman Kodak Company</i>	263
5:10 p.m.	Synchrotron Radiation - Powerful Instrument for Production of New Materials in the New Millennium B. P. Tolochko, B. B. Bokhanov, V. F. Pindyurin, V. I. Kondratev, Institute of Solid State Chemistry and Institute of Nuclear Physics	265

7:30 to 9:30 p.m. - Dinner Break

Thursday, September 14, 2000

8:30 a.m. to Noon Session 6 —Color Forming Technologies

Session Co-Chairs: Wolfgang Schmidt, Agfa Gevaert AG; Jon Staples, Eastman Kodak Company

8:30 a.m.	New Coupler Technologies	266
	Sundaram Krishnamurthy, John Harder and Robert F. Romanet Eastman Kodak Company	
8.55 a m	Senarating Developer and Amplifier Baths, Achieving Process Stability	269

8:55 a.m. Separating Developer and Amplifier Baths: Achieving Process Stability 269 and Superior Image Quality in a Low Silver System, Kazuhiro Miyazawa, Yoshihiko Suda, Noriyuki Kokeguchi, Junji Itoh, Konica Corporation

9:20 a.m.	Qualitative Study of the Kinetics of the Color Formation of a Color-Forming Material By Time-Resolved Specular Transmision Kris Viaene and Rene De Keyzer, Agfa Gevaert NV	273
9:45 a.m.	A Color-Forming Reaction in the System of Reversed Microemulsions <i>Chun-yan Liu, Zhi-ying Zhang, Xue-Fu Cui, Institute of Photographic</i> <i>Chemistry, Chinese Academy of Sciences</i>	276
	10:10 to 10:30 a.m. Coffee Break	
10:30 a.m.	Investigation of Ionization and Coupling Mechanisms for Pivaloyl- acetanilide Yellow Couplers Bearing <i>o</i> -Sulfonamidophenoxy Coupling-Off Groups Michael P. Youngblood, T. R. Welter and F. Abu-Hasanayn, Eastman Kodak Company	280
10:55 a.m.	Evolution of Automated Turn-Key System for the Production of Rainbow and Reflection Holograms <i>David Ratcliffe¹, Alexey Rodin^{1,2} and Stanislovas Zacharovas²</i> , ¹ UAB GEOLA, Vilnius, Lithuania, ² Institute of Physics, Vilnius, Lithuania	283
11:20 a.m.	Recent Advances in Holographic Materials Chemical Processing From Geola Stanislovas J. Zacharovas ¹ , Alexey M. Rodin ^{1,2} , David B. Ratcliffe ¹ and Sergey P. Vorobiov ³ , ¹ UAB GEOLA, Vilnius, Lithuania, ² Institute of Physics, Vilnius, Lithuania, ³ The Holographic Studio at the VVC All-Russian Exhibition Center, Moscow, Russia	287

11:45 a.m. - 12:00 p.m. Concluding Comments

12:00 to 1:30 p.m. Farewell Luncheon

* Asterix indicates paper not available at time of publication