



Article: The Daguerreotype Uncovered: An Overview of the Surface and Subsurface Chemistry, Physics and Material Science Underlying the First Photographic Process Based on Electron Microscopical Studies (Abstract)

Author(s): Patrick Ravines, Anne West, Lingjia Li, Lisa Chan, Robledo O. Gutierrez Jr., Rob McElroy, Natasha Erdman, and Peter Bush

Topics in Photographic Preservation, Volume 16.

Pages: 313-314

Compiler: Jessica Keister

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Topics in Photographic Preservation is published biannually by the Photographic Materials Group (PMG) of the American Institute for Conservation (AIC). A membership benefit of the Photographic Materials Group, *Topics in Photographic Preservation* is primarily comprised of papers presented at PMG meetings and is intended to inform and educate conservation-related disciplines.

Papers presented in *Topics in Photographic Preservation, Vol. 16*, have not undergone a formal process of peer review. Responsibility for the methods and materials described herein rests solely with the authors, whose articles should not be considered official statements of the PMG or the AIC. The PMG is an approved division of the AIC but does not necessarily represent the AIC policy or opinions.

The Daguerreotype Uncovered: An Overview of the Surface and Subsurface Chemistry, Physics and Material Science Underlying the First Photographic Process Based on Electron Microscopical Studies

Patrick Ravines, Anne West, Lingjia Li, Lisa Chan, Robledo O. Gutierrez Jr., Rob McElroy, Natasha Erdman, and Peter Bush

Presented at the PMG session of the 2015 AIC Annual Meeting in Miami, Florida.

Modern made daguerreotypes have been studied using 2D and 3D focused ion beam scanning electron microscopy (FIB-SEM) and transmission electron microscopy (TEM)/Scanning transmission electron microscopy (STEM) to investigate each step of the daguerreotype making process. This study shows that the image particle formation of the daguerreotype process appears to be composed of three steps: The first step is the light-initiated reduction of silver halides to silver clusters; followed by mercury development where the second step is the reaction of silver clusters with gaseous mercury to form the initial silver mercury amalgam, and the third and final step is the solid-state diffusion of silver from the surface and sub/meso-surface to continue to react with mercury to form large enough silver mercury amalgam image particles to scatter light and create the visible image. A description of the chemistry, physics and material science of each step in this process will be reviewed. It is hoped that this presentation will provide a better understanding of some of the underlying fundamental scientific principles of one of the earliest photographic processes and thereby increase our appreciation of it and assist in efforts to preserve and conserve it.

Patrick Ravines

Art Conservation Department
State University of New York College at Buffalo

Anne West

Eastman Kodak Company (retired)

Lingjia Li and Lisa Chan

TESCAN USA Inc.,

Robledo O. Gutierrez Jr.

Corporate Engineering & Analytical Science
Eastman Kodak Company

Rob McElroy

Archive Studio

Natasha Erdman

JEOL USA Inc.

Peter Bush

South Campus Instrumentation Center
State University of New York College at Buffalo