

# **LASER CHARACTERIZATION AND CLEANING OF NINETEENTH CENTURY DAGUERREOTYPES**

John C. Miller and Valeri V. Golovlev  
Life Sciences Division  
Oak Ridge National Laboratory  
Oak Ridge, Tennessee 37831-6125

Grant Romer  
Director of Conservation & Museum Studies  
George Eastman House  
Rochester, New York

Paul Messier  
Conservator of Photographs, Boston Art Conservation  
Boston, Massachusetts

## **ABSTRACT**

Daguerreotypes were the first form of photographs and were popular between 1840 and 1860, after which they were superseded by more modern techniques. The daguerreotype image is composed of silver/mercury microcrystals of varying size and density on a silver coated copper substrate. Nineteenth century daguerreotypes, over the intervening 140 years, have suffered degradation and oxidation, which has greatly reduced their historic and artistic value. Laser ablation techniques have been previously explored for use in the characterization, dating, and restoration of historic paintings, parchments, stained glasses, and statues, but have not been seriously applied to daguerreotypes. Although several such programs exist in Europe, none, to our knowledge, exists in the United States.

We report here the use of a number of modern surface science techniques (especially those using lasers and microscopy) to characterize and analyze both normal and degraded daguerreotypes. Then, attempts to use laser ablation techniques for cleaning and restoring damaged nineteenth century samples will be described. The optimal wavelength, pulse length, pulse energy, and focussing conditions are expected to be critical for effective cleaning while preventing damage to the fragile image.

Oak Ridge National Laboratory managed by Lockheed Martin Energy Research Corporation for the U.S. Department of Energy under Contract No. DE-AC05-96OR22464.

