

Characterization, Degradation, and Analysis of Platinum and Palladium Prints



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Freer Gallery of Art and Arthur M.
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Presenting research performed at the
National Gallery of Art

Platinum and palladium prints are among the most rare and highly valued photographs in today's collections, yet their chemical nature and their degradation processes are not completely understood. The paper, sizing, toning metals and printing conditions all have significant impacts on the visual aesthetic of these prints, yielding differences in image tone, density and dynamic range. Additionally, despite their reputation for permanence, and the observation that many prints remain in exquisite condition, some prints, both historic and modern, exhibit various forms of deterioration, including stains. The causes of such stains and potential treatments have been explored through the examination of naturally aged prints and the production of stained prints via accelerated aging. To better understand the factors that make a given print look and age in a particular way, a large set of custom prints was prepared varying the surface sizing, printing metal, toning metal, relative humidity and processing chemicals. Examination by electron microscopy provided insight into the nanoscale structure of the prints. X-ray fluorescence studies related the optical density and colorimetry values to the printed metal density. The amount of residual metals, particularly iron, was compared to the processing conditions, such as washing and clearing times and clearing agent (e.g., dilute hydrochloric acid or sodium citrate). These initial processing conditions lay the foundation for the potential formation of stains over time as demonstrated by accelerated aging studies. In conjunction with research into stain removal through chelating agents, these studies provide insight into the challenges and guidance for care of platinum and palladium prints.

Image: X-ray fluorescence analysis of a platinum print by photographer Olive Edis, part of the NGA Photograph Conservation Study Collection.

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