



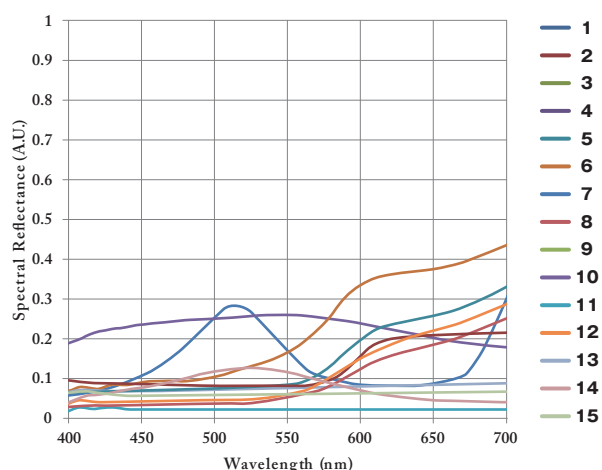








28×27cm



## Pigment Analysis

Using analytical imaging it is possible to extract material information from the images scanned by the high resolution scanning system at the single pixel level (a few microns). Spectral information is estimated using a calculation model that was created by the laboratory members. Fifteen distinct points representing different pigments used in the large folding screen. The spectral reflectance curves of those points were reconstructed and compared to those of a data base of Japanese pigments. Since the spectral reflectance is a material property, it is possible to estimate the material used in creating the respective colors found on the folding screens. This approach is a non-invasive and non-destructive way of analyzing precious cultural heritage artifacts.

The Edo period (1603–1868) in Japan saw tremendous changes in the nation's economy, social structure and art. Kyoto already had a particularly rich cultural base for refining the changes in art and cultural activities. The painting reproduced in the front page of this booklet is from a scene on a pair of folding screens (*byōbu*), recording a Japanese theatrical performance of the early Edo era. The screens depict, in stunning detail, a performance of *onna kabuki* (women's kabuki), a theatrical performance by women involving music and dance. The performance portrayed is in the Yasaka area of Kyoto, and includes detailed renderings of the surrounding social environment. The screens, with their gilded reliefs, are estimated to be approximately 400 years old, and are valuable cultural and historical artifacts. They highlight the techniques of Japanese painting employed at the time, as well as the social position and historical background of one of the Asia's most revolutionary forms of theatre—*onna kabuki*, which would later be banned for almost two centuries, during which time the female performers were replaced by men. The screens are extremely well preserved, and are a source of rare historical data about the pigments, garments, and stage designs of the period. They also serve as a record of the way in which popular arts were enjoyed by common people, monks, and nobles.



Located in Kyoto, a city of art, culture, and technology, the Ide Laboratory of Kyoto University's Graduate School of Engineering has developed state-of-the-art imaging technologies to scientifically record cultural heritage artifacts and sites in Kyoto and around the world. The laboratory has developed a high precision scanner system which can digitize large artworks, such as Japanese screens, wall paintings, precious design maps of important historical buildings, and industrial design drawings which have been designated as world heritage artifacts, such as those for Olympic class ships, including the Titanic. The scanner is distinct in that its high dimensional and color reproduction accuracy is one order of magnitude higher than commercial imaging systems. The digitization of the *onna kabuki byōbu* was a joint project between the Kyoto University Graduate School of Engineering and Waseda University's Tsubouchi Memorial Theatre Museum, where the screen is located. In 2014, the Graduate School of Engineering collaborated with several national and international institutes to scientifically record important cultural heritage artifacts and UNESCO-designated world cultural heritage sites in microscopic detail. One of the projects is in collaboration with the Victoria and Albert Museum in London, and will be exhibited there from July–September 2015. The project involves the high resolution digitization of four large historically important European paintings that are located at four different sites in the UK and Spain. In the past decade the graduate school has carried out projects at various locations in China, the UK, Italy, South Korea, Egypt, and the Philippines, as well as at over fifty sites in Japan. Through this work, the graduate school seeks to establish a global network for collaboration to preserve and utilize the world's cultural resources, and pass them down to the next generation. We hope that this technology, born in Kyoto, will serve as a catalyst to encourage renewed global discussion and interest in diverse aspects of art and culture.

*Onna Kabuki zu Byobu*, folding screen Courtesy of The Tsubouchi Memorial Theatre Museum, Waseda University.