

Using Optical Coherence Tomography to Examine the Structure of Ancient Chinese Glaze and Jade

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The ancient Chinese primary used two mineral materials, nephrite and jadeite, to carve objects into specific forms for ceremony or dressing. Nephrite has been used for more than five thousand years, whereas jadeite came into use very late, beginning in the seventeenth century. Therefore, in general, archaeological jade in China was made of nephrite. Nephrite is a fibrous aggregates twinned by long, bladed crystals. However, the natural variation of structure in jade caused by the loss of certain elements from its composition results in a loose structure after being buried for a long period.

The glaze is a glass melt coated on the surface of a vessel. Chinese high-temperature glazes usually consist of three major phases (components): homogeneous glass phase, liquid-liquid phase separation phase and crystallization phase. They form the specific structure of the glaze matrix. However, the variety of glaze structure has an immediate relationship with the individual recipe and heat treatment process. Therefore, the structure actually reflects the ceramic manufacturing technology.

Optical Coherence Tomography (OCT) presents structure characteristic and establishes the structure model of glaze or jade samples that aid the authentication of museum collections¹. In addition, the OCT image provides crucial information related to the variation of structure that is important not only for conservation scientist to treat the deterioration of archaeological materials or artworks², but also for the art historian to understand the history of each ceramic or jade object³.

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