## SPM and PIXE on the study of Chinese ancient porcelain

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The Chinese ancient blue-and-white and greenish white porcelain produced in Jingdezhen was very famous in the world. Many researchers focus on chemical compositions of blue-and-white porcelain, and lacking of study on the manufacture technologies of it. To ancient greenish white porcelain, the research about it has not been available. This paper reports the results of ancient blue-and-white porcelain samples produced in Ming Dynasty analyzed by SPM and PIXE, and the ancient greenish white porcelain samples produced from Northern Song Dynasty (AD 960) to Later Yuan Dynasty (AD 1320-1368) analyzed by PIXE. The analyzed results indicated a middle layer nearly 5  $\sim$ 10  $\mu$ m that between the body and blue glaze. According to the ratios of MnO/CoO, Fe<sub>2</sub>O<sub>3</sub>/CoO, the asbolites of the blue glaze produced in Zhejiang, Fujian and Jiangxi province.

The major chemical compositions of greenish white glaze of Late Yuan Dynasty are different from that of Song Dynasty and Early Yuan Dynasty. The variable colors of greenish white glazes are mainly affected by concentrations of manganese oxide and the ferric oxide. In the body and glaze of ancient greenish white porcelain, some concentrations of minor and trace elements, such as As, Ba, Co, Cr, Sr etc are very lower, conversely, in the modern and fake porcelain body and glaze, they are much higher than that. So, it can be considered as the finger-printing elements of provenance and it would be useful to identify precious ancient porcelain from a fake.