

Analysis of thermal phases in Canaanite ceramic 'Metallic Ware' using FT-IR spectroscopy

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Early Bronze Age (EBA) ceramic 'Metallic Ware' from the North Canaan was analyzed using FT-IR spectroscopy and applying of curve fitting and second derivative techniques. The Metallic Ware is hard, highly fired pottery which resounds with a distinctive metallic ring when struck. The spectroscopic analysis is advantageous in analysis of amorphous and short-range ordered thermal phases lacking of XRD peaks. The applying the spectral analysis improves the identification of the individual phases in the composition of the pottery. The results demonstrate that the ceramic 'Metallic Ware's are composed of non-calcareous or poorly-calcareous ceramics. The spectra demonstrate that the vessels are composed mainly of meta-clay. The type of the meta-clay in the composition of the pottery is identified by the location of the main SiO stretching band using curve fitting and second derivative techniques. Most of the ceramic 'Metallic Ware's contain mixtures of metakaolinite and meta-smectite. The appearance of both phases, indicates that calcareous raw materials contained smectite and kaolinite, were used for manufacture of the 'Metallic Ware'. It seems that the presence of smectite in the raw material enable sintering at lower firing temperature.

Study of geochemistry, geochronology and petrogenesis of the Early Paleozoic granites in South China

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This paper shows results of petrology, geochemistry, zircons U-Pb dating and *in situ* Hf isotope. Geochemically, the A/CNK values have an average of 1.16; the REE compositions show higher Σ REE contents, enrichment in LREEs, depletion in Eu and REE patterns; the trace element spider diagrams are enrichment in Rb, Th, U and depletion in Ba, Sr, Nb, Ti. Zircons mostly exhibit euhedral and high Th/U values, an average of 1.08. The zircons from thirty plutons yielded rather similar U-Pb concordia ages from 436±6 Ma to 441±4 Ma, corresponding to Llandovery Epoch of Silurian. Several xenocrysts yielded the U-Pb ages around 700 Ma, implying that a breakup event took place during Neoproterozoic. *In situ* Lu-Hf isotopic analysis shows that all the $\epsilon_{\text{Hf}}(t)$ value of zircons are negative, and their model ages (TDM2) values indicate that the Silurian granitic magma came from the recycle of Meso-Paleoproterozoic basement. Researches suggest that an intracontinental tectono-magmatic event took place during the Early Paleozoic, which is characterized by folding and thrusting, leading to crustal shortening and thickening. The high geothermal temperature from thickening crust and accumulation of producing high-heat radioactive elements will gradually soften crustal rocks and cause a partial melting, forming peraluminous granitic magma. Under the post-orogenic extensional and de-pressure condition, these granitic magma rose and emplaced in the upper crust, leading to development of S-type plutons.