

Mineralogical characteristics of fine particles of the tuff weathering crust from the Bachi rare earth element (REE) deposit

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Abstract: In this work, geochemical and mineralogical characteristics of fine particles (diameter < 2 μm) in the tuff-weathering crust of the Bachi rare earth element (REE) deposit in Northern Guangdong have been investigated by using the inductively coupled plasma mass spectrometry (ICP-MS), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and transmission electron microscopy (TEM). The results show that the REE concentration of fine particles was approximately two times of that of the bulk sample of the tuff-weathering crust. Clay minerals, mainly including tubular halloysite and platy kaolinite, are dominant minerals in fine particles. They played an important role for the occurring state of REE, particularly for cerium. Nano-sized cerianite particles could be adsorbed on the surface of clay minerals by the Coulomb force. The REE characteristics of the weathered layer of the tuff-weathering crust and the information of mineral components, micromorphology and microstructure of the fine particles are of significance for understanding the REE mineralization processes of the tuff weathering crust type of REE deposit.

Keywords: rare earth elements; tuff-weathering crust; kaolinite; halloysite; cerianite