

SCANDIUM SPECIATION IN A WORLD-CLASS LATERITIC DEPOSIT

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Scandium (Sc) has unique properties, highly valued for many applications. Future supply is expected to rely on unusually high-grade (up to 1000 ppm) lateritic Sc ores discovered in Eastern Australia. To understand the origin of such exceptional concentrations, we investigated Sc speciation in one of these deposits. The major factors are unusually high concentrations in the parent rock together with lateritic weathering over long time scales in a stable tectonic context. At microscopic and atomic scales, by combining X-ray absorption near edge structure spectroscopy, X-ray diffraction and microscopic and chemical analyses, we show that Sc-rich volumes are associated with iron oxides. In particular, Sc adsorbed on goethite accounts for *ca* 80 % of the Sc budget in our samples. The remaining is incorporated in the crystal structure of hematite, substituting for Fe³⁺. Scandium grades reflect the high capacity of goethite to adsorb this element. In contrast, the influence of hematite is limited by the low levels of Sc that its structure can incorporate. These crystal-chemical controls play a major role in lateritic Sc deposits developed over ultramafic–mafic rocks.