the chemistry of distinctive titanite generations can be linked to processes for which ages can be determined.

The purpose of this study is to document the major and trace element chemistry of previously dated titanite from selected plutonic rocks ranging in composition from gabbro to syenite, and from metamorphic rocks ranging from greenschist to granulite facies. These data will be used to potentially identify characteristic signatures of titanite crystallized in different geological environments.

To establish the analytical technique, a large gem-quality titanite was analyzed by laser ICP-MS, electron microprobe and ion microprobe, and these results cross-calibrated. This crystal is now the internal standard. Samples were mounted in epoxy, polished and coated in gold, and then imaged by BSE using an SEM to identify internal complexities such as cores vs rims, or growth zoning. Analyses were carried out using a Cameca 4f ion microprobe with a primary O^- ion beam. Data were reduced in an Excel spreadsheet and concentrations calculated with reference to the internal standard values. Results are presented of REE and HFS patterns from these selected samples of titanite, as well as an assessment of their potential petrogenetic use.

An ion microprobe investigation of the trace element chemistry of titanite as a function of magma composition and metamorphic grade

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Titanite ($CaTiSiO_5 \cdot H_2O$) is a common accessory mineral in igneous and metamorphic rocks and occurs as detritus in sedimentary rocks. It accepts many trace elements which substitute for Ca or Ti. They include the important rare earth elements (REE) and high field-strength (HFS) elements such as Nb, Ta, and Y, which are used in tracing the petrogenesis of rocks. Because titanite can be dated using the U-Pb technique,

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