

# COM-1 and Hongcheon: New monazite reference materials for the microspot analysis of oxygen isotopic composition

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Monazite, a moderately common light rare earth element (LREE) and thorium phosphate mineral, has chemical, age, and isotopic characteristics that are useful in the investigation of the origin and evolution of crustal melts and fluid-rock interactions. Multiple stages of growth and partial recrystallization commonly observed in monazite inevitably require microspot chemical and isotopic analyses, for which well-characterized reference materials are essential to correct instrumental biases. In this study, we introduce new monazite reference materials COM-1 and Hongcheon for the use in the microspot analysis of oxygen isotopic composition. COM-1 and Hongcheon were derived from a late Mesoproterozoic (~ 1080 Ma) pegmatite dyke in Colorado, USA, and a Late Triassic (~ 230 Ma) carbonatite-hosted REE ore in central Korea, respectively. The COM-1 monazite has much higher levels of Th ( $8.77 \pm 0.56$  wt.%), Si ( $0.82 \pm 0.07$  wt.%) and lower REE contents (total REE =  $49.5 \pm 1.2$  wt.%) than does the Hongcheon monazite (Th,  $0.23 \pm 0.11$  wt.%; Si,  $< 0.1$  wt.%; total REE,  $59.9 \pm 0.7$  wt.%). Their oxygen isotopic compositions ( $\delta^{18}\text{O}_{\text{VSMOW}}$ ) were determined by gas-source mass spectrometry with laser fluorination (COM-1,  $6.67 \pm 0.08\text{‰}$ ; Hongcheon-1,  $6.60 \pm 0.02\text{‰}$ ; Hongcheon-2,  $6.08 \pm 0.07\text{‰}$ ). Oxygen isotope measurements performed by a Cameca IMS1300-HR<sup>3</sup> ion probe showed a strong linear dependence ( $R^2 = 0.99$ ) of the instrumental mass fractionation on the total REE contents. We characterized chemical and oxygen isotopic compositions of COM-1 and Hongcheon monazites. Their internal homogeneity in oxygen isotopic composition and chemical difference provide an efficient tool for calibrating instrumental mass fractionation occurring during secondary ion mass spectrometry analyses.