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In-situ Sr isotope ratio determination in fluid-derived late-stage parageneses in gabbros from the lower oceanic crust

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Many gabbros for recent ocean ridges show characteristic late-stage parageneses consisting of An-enriched plagioclase, pargasite and orthopyroxene growing interstitially or forming rims around olivine and clinopyroxene, for which a formation by partial melting triggered by water-rich fluids is implied (e.g., Koepke et al. 2005). Similar late stage assemblages occur also in veins of deep-crustal gabbros from the Oman ophiolite. According to Bosch et al. (2004), these were formed by some type of a seawater-derived high-temperature activity which was evidenced by isotopic studies on mineral separates. We applied in-situ Sr isotope analyses on zones of An-enriched plagioclase of such late-stage parageneses in oceanic gabbros from the Oman ophiolite and from the Southwest Indian Ridge (SWIR; Leg 176; drilled by ODP) in order to discriminate between hydrous primary magmatic, and seawater-induced late-stage processes. We used the LA-MC-ICPMS system recently developed in Hannover consisting of a femtosecond laser and a multiple collector inductively coupled plasma mass spectrometer. First in-situ Sr isotope analyses on An-enriched plagioclases of such late-stage assemblage from gabbros of the Oman and SWIR are done. In spite of severe analytical difficulties (e.g. extreme low Sr concentration in the corresponding An-enriched plagioclases) the measurements reveal enriched 87Sr/86Sr-ratios, implying an influence of seawater-derived fluids during formation. The results imply that seawater-derived hydrothermal activity is involved during a late stage of crustal accretion under the mid-ocean ridges. The results imply that hydrothermal activity ob-

viously affects the deep oceanic crust, opening interesting perspectives in modifying cooling models by considering the additional cooling effect of hydrothermal circulation at very high temperatures.