FeO-RICH IGNEOUS RIMS AROUND CR CHONDRULES

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Convoluted igneous rims occur around many CR chondrules; these rims average 270-μm thickness and are relatively low in FeO (e.g. Fa2 in chondrule F3o from LAP 02342 [1,2]). We have analyzed a different type of altered igneous rim that is rich in FeO and occurs around low-FeO PO and POP chondrules in two CR chondrites: LAP 02342 and QUE 99177. Two chondrules from QUE 99177 and five from LAP 02342 are at least partially surrounded by a 5-30-μm-thick phyllosilicate layer, characterized by ~40 wt% FeO and low analytical totals. The precursors of these layers may have formed from a moderately low viscosity fluid that coated the chondrules. In some cases, silica (and probably pyroxene) was partly assimilated by the melt. The rim around chondrule H9c in QUE 99177 has a "honeycomb" texture consisting of distinct 3-8-μm-size patches of almost pure SiO_2 and moderately ferroan (Fs25 Wo5) low-Ca pyroxene. The honeycomb structure, which appears to have formed from an immiscible melt, is thicker inside embayments at the chondrule surface. In two of the chondrules, the main FeO-rich phyllosilicate rim is surrounded by a less-ferroan (~30 wt% FeO) phyllosilicate layer; a sharp boundary separates the two layers in these two-tone rims.

We infer that these igneous rims formed by flash-melting fine-grained mixes of ferroan pyroxene, metallic Fe-Ni, plagioclase, and in some cases silica that surrounded the chondrules. After agglomeration, aqueous alteration on the CR parent asteroid selectively produced a phyllosilicate layer from the igneous rims; this alteration process was facilitated by the fine grain size and moderately ferroan composition of the igneous rims. The differences in FeO in the two-tone rims probably reflect compositional differences in the precursors. Nonetheless, some of the FeO in the phyllosilicate layers was probably introduced by aqueous fluids that had dissolved fine-grained matrix metal. Krot et al. [3] described SiO_2-rich rims on many CR chondrules. We infer that much of the SiO_2 in our igneous rims resulted from the incorporation of SiO_2 from these preexisting rims.

References: [1] Wasson J. T. and Rubin A. E. 2009. *Geochimica et Cosmochimica Acta* 73: 1436-1460. [2] Rubin A. E. 2010. Abstract #1011. 41st Lunar and Planetary Science Conference. [3] Krot A. N. 2004. *Meteoritics & Planetary Science* 39: 1931-1955.