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Chondrule formation in ordinary chondrites

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Chondrules are ubiquitous in chondrites but their formation mechanism remains elusive. Their textural and oxygen isotopic characteristics in carbonaceous chondrites (CCs) suggest that they result from the recycling of isotopically heterogeneous early-condensed precursors via gas-melt interactions [1]. We [2] performed high-resolution X-ray elemental maps and *in-situ* O isotopic analyses of type I PO chondrules from ordinary chondrites (OCs). Our results reveal that similar processes established the observed features of OC and CC chondrules. The mass-dependent isotopic variations recorded by host olivine grains result from kinetic effects induced by evaporation/recondensation processes during the gas-melt interactions. OC chondrules formed through enhanced recycling processes, as infered by multiple generations of relict olivine grains, appearing in lower abundances compared to CC chondrules. Based on $\Delta^{18}O$, we inferred a lack of genetic relationship between CC and OC chondrules, suggesting limited radial transport in the protoplanetary disk.

[1] Marrocchi et al. (2019) GCA 247, 121–141. [2] Piralla et al. (2021) GCA 313, 295–312.

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