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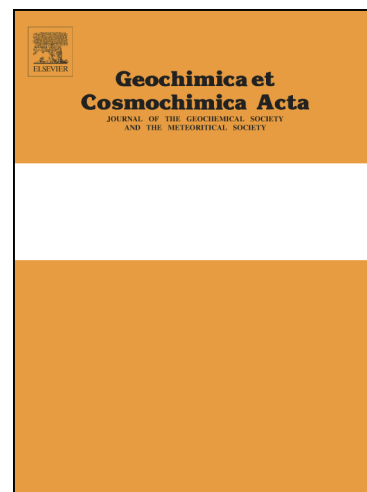
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**A magmatic origin for silica-rich glass inclusions hosted in porphyritic magnesian
olivines in chondrules: an experimental study**

François Faure^{1,2}, Laurent Tissandier^{1,2}, Léa Florentin^{1,2}, Karine Devineau^{3,4}

¹Université de Lorraine, CRPG, UMR 7358, 15 rue Notre Dame des Pauvres F-54501 Vandoeuvre-lès-Nancy France.

²CNRS, CRPG, UMR 7358, 15 rue Notre Dame des Pauvres F-54501 Vandoeuvre-lès-Nancy France.

³Université de Lorraine, GeoRessources, UMR 7359, Faculté des Sciences et Technologies rue Jacques Callot BP 70239, F-54506 Vandoeuvre-lès-Nancy Cedex France

⁴CNRS, GeoRessources, UMR 7359, Faculté des Sciences et Technologies rue Jacques Callot BP 70239, F-54506 Vandoeuvre-lès-Nancy Cedex France

Abstract

Rare silica-rich glass inclusions ($69 < \text{SiO}_2 < 82$ wt.%) are described within magnesian olivines of porphyritic Type IA chondrules. These glass inclusion compositions are clearly out of equilibrium with their host Mg-olivines and their presence within the olivines is generally attributed to an unclear secondary process such as a late interaction with nebular gases. We performed dynamic crystallisation experiments that demonstrate that these Si-rich glass inclusions are actually magmatic in origin and were trapped inside olivines that crystallized slowly from a magma with a CI, i.e. solar, composition. Their silica-rich compositions are the consequence of the small volumes of inclusions, which inhibit the nucleation of secondary crystalline phase (Ca-poor pyroxene) but allow olivine to continue to crystallize metastably on the walls of the inclusions. We suggest that Si-rich glass inclusions could be the only reliable relicts of what were the first magmas of the solar system, exhibiting a CI, i.e. non-fractionated, composition.

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