Si-rich glass inclusions trapped within olivines of type IA chondrules: only relicts of the first magmas of the solar system?

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Rare silica-rich glass inclusions ($69 < SiO_2 < 82$ 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.