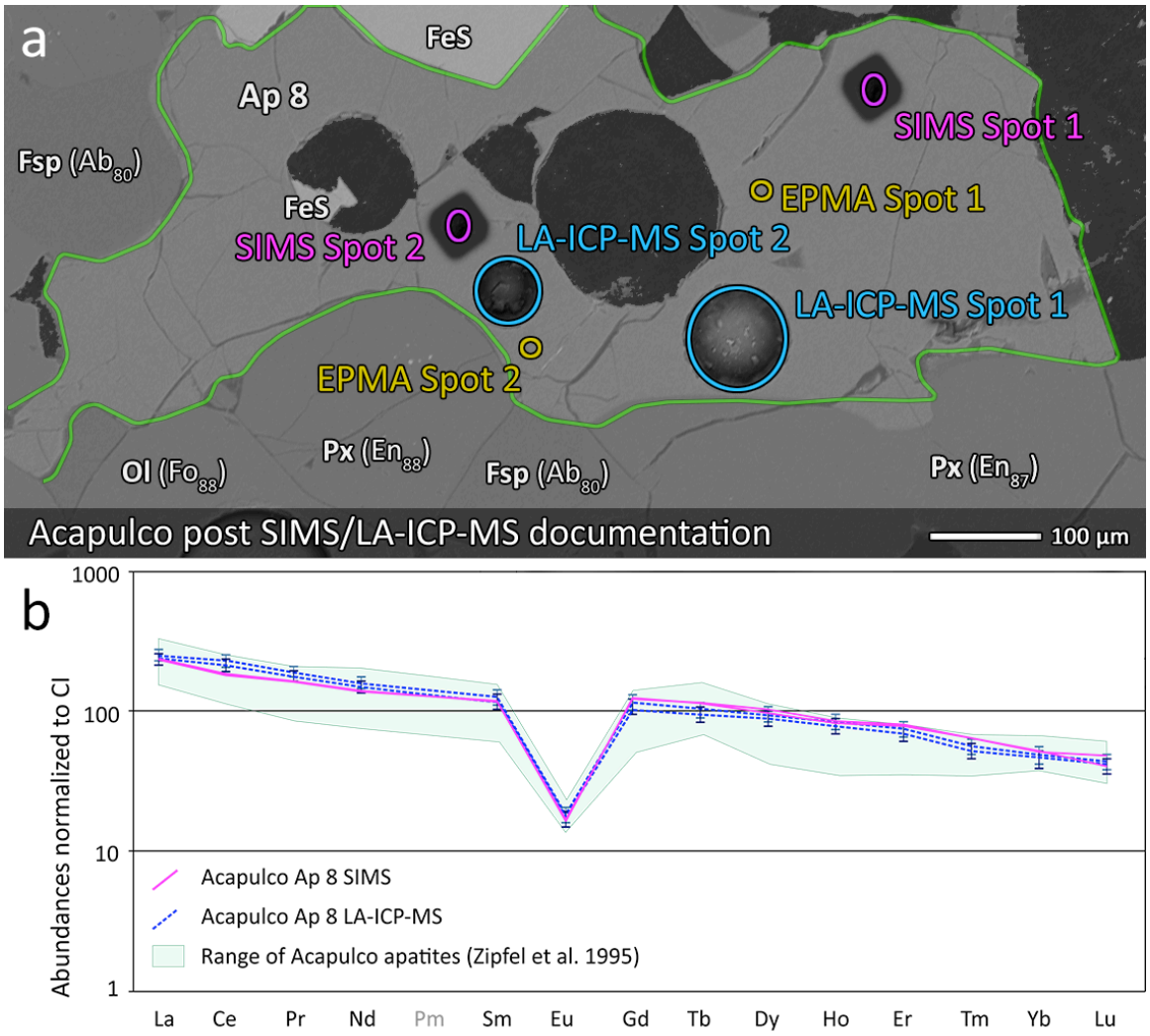

Supplementary Fig. S1 On selected grains, multiple analyses were performed with both methods (SIMS, as well as with LA-ICP-MS, see text for details).

(a) Post-analyses (LA-ICP-MS and SIMS) secondary electron- SEM image of an exemplary apatite grain in the Acapulco meteorite. The apatite grain boundary is marked with the green, solid line. After the measurements were conducted, the position of the spots was checked at the SEM in order to ensure they were on target and not on grain boundaries or inclusions. The LA-ICP-MS spots (55 and 85 µm) are marked blue, while the SIMS spots of ~15 µm are outlined in magenta. The position of the EPMA analyses is labeled in orange.

Phase-abbreviations: Ab = albite; Ap = apatite; En = enstatite; FeS = iron-sulfide; Fsp = feldspar; Fo = forsterite; Ol = Olivine; Px = pyroxene.

(b) Chondrite normalized REE patterns corresponding to the spots labeled in (a). The error bars represent the 2σ-errors. Obtained analyses for this grain overlap within error and are consistent with the range of literature data published by Zipfel et al. (1995), outlined by the light green area.