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# Origin and genesis of alluvial sapphires from the Orosmayo region, Sierra de Rinconada, Jujuy Province, northwest Argentina

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This study sought to investigate the origin and genesis of 16 alluvial colourless to blue sapphires from the Orosmayo region, Sierra de Rinconada, Jujuy Province, northwest Argentina (Fig. 1,2). The investigation expands on previous geochemical analyses conducted on these sapphires [1], which lacked more recent techniques that are essential for understanding the genesis of sapphires [2]. Analyses of the grains were conducted using scanning electron microscopy (SEM), electron microprobe analysis (EMPA), energy dispersive spectroscopy (EDS) and laser ablation inductively-coupled plasma-mass spectrometry (LA-ICP-MS).

Abrasion textures consist largely of percussion marks (glassy and pitted surfaces) and magmatic resorption (smaller frosted indentations), suggesting both magmatic and later physical transport of the grains. The sapphires exhibit geochemical signatures related to both magmatic and metamorphic environments, with diagnostic chromophore ratios (Ga/Mg, Fe/Mg) indicating a transitional suite pertaining to metasomatic processes.

Enrichments in Nb and Ta suggest that sapphire growth was influenced by high field strength element (HFSE)-bearing systems, likely representing rare earth element (REE)-bearing carbonatites previously reported from the Jujuy Province [3]. Further enrichments in Be and Sn offer evidence for genesis involving an evolved felsic magmatic source. A distinctly bimodal inclusion suite provides further evidence for both a carbonatitic and an evolved felsic source. The preceding strongly suggests that the sapphires formed through metasomatic


*Figure 1: Jujuy Province, NW Argentina*

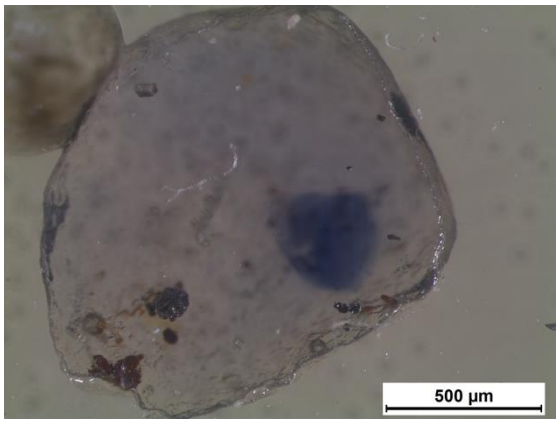


*Figure 2: Polished grain mount of a Jujuy*

exchange between these two magmatic systems. *sapphire exhibiting blue colour zonation*

It is likely that the corundum was incorporated as xenocrysts in lamprophyre dykes during the Lower Cretaceous (140 – 110 Ma), as previously proposed [1]. The identification of elevated concentrations of light rare earth elements (LREEs), Th, U and Sn suggests that corundum can be used as an exploration tool for identifying potential economic deposits.

*References:*

[1] Zappettini E. et al. (1997) Actas VIII Congreso Geológico Chileno, 2:1598-1602

[2] Peucat J. et al. (2007) Lithos, 98:261-274

[3] Zappettini E. et al. (1998) Actas X Congreso Latinoamericano de Geología, 2:295-299