Emerald dating through $^{40}\text{Ar}/^{39}\text{Ar}$ step-heating and laser spot analysis

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Direct K-Ar dating of beryl and emerald appears difficult because of the large amounts of excess argon occupying mainly the hexagonal channels. Combined step heating and spot fusion $^{40}\text{Ar}/^{39}\text{Ar}$ analysis on individual syngenetic phlogopite and muscovite grains with a continuous laser probe allow to resolve this problem.

(1) Brazilian emerald: Phlogopites associated with emerald from the Carnaiba deposit (Bahia State, Brazil) are dated through (1) step heating analysis of bulk samples and single grains and (2) spot fusion experiments performed on syngenetic solid inclusions precipitated along growing zones of the emerald host crystals. Plateau ages of $1926 \pm 8$ Ma (single grain), $1942 \pm 8$ Ma (bulk sample; Brãnia) and $1951 \pm 8$ Ma (single grain; Trecho Velho) were obtained on phlogopites around the emerald. Similar (but more scattered) ages were obtained by spot fusion on minute phlogopite inclusions inside the beryl, in spite of huge amounts of excess argon detected in the emerald host crystal. These definitely set the genesis of the Carnaiba occurrences during the Transamazonian tectono-thermal event (2100-1800 Ma).

(2) Colombian emerald. Two emerald deposits (Muzo-Quipama and Coscuez) from the western emerald belt have been dated for the first time. Laser probe step heating and spot fusion $^{40}\text{Ar}/^{39}\text{Ar}$ analysis on synchronous greenish V-Cr muscovite aggregates. Two distinct ages have been obtained at respectively 31.5-32.6 Ma for Quipama and 35-38 for Coscuez. These ages constrain the pressure (1.12-1.06 kb) and temperature (290-360°C) of the Colombian emerald.
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