CAPOEIRANA EMERALD DEPOSIT – STRUCTURAL AND THERMODYNAMIC CONTROL

F.R.M. Pires*, N. Palermo, UERJ, Rio de Janeiro State University and M. A.Fonseca, UFOP, Federal University of Ouro Preto.

Emerald such as other precious and semi-precious stones are gemstones with physical and chemical properties that make them for personal adornment, decorative purposes and also used for statuettes, objects d'art, jewelry and for exhibitions. Emerald is the most valuable of all precious stones competing with diamond. Emerald occurs in several greenstone belts and the Capoeirana Area with the deposits of Belmont, Piteiras and Black Swan deposits (Itabira District, MG) object of present presentation. Córrego do Fogo (Malacacheta) and Sossego (Ferros, MG) deposits will be treated soon. Genetic aspects of these deposits have been covered in the past (Giuliani et al, 1990; Souza et al., 1992). The Archean greenstone belt where the meta-ultramafic rocks with emerald exists corresponds to strongly metasomatized belts transformed in phlogopitites, talc schist-rich, with anthophyllite emphasizing serpentine as the main ultramafic mineral formed. Three types of greenstone belt can be recognized in the Eastern Brazil: 1. Mn-formation (gondite–queluzite) type, pertaining mostly to Barbacena Group; 2. Fe-formation or iron formation (itabirites) type and gold, pertaining to the Rio das Velhas Group; 3. Chromite-phogopite-emerald type. It is observed that the greenstone belt composition and metamorphism varies along the belt. Metamorphism in the greenschist-amphibolite grade affected the ultramafics producing greisens and hydrothermal activities forming emerald with phlogopite, talc and rarely chrysotile and serpentine under alkaline ambient provided by Na and K from decayed albite, K-feldspar and Mg from the Mg-rich minerals, mostly serpentine. Anthophyllite is relatively frequent and garnet seldom appears in phlogopitite. Metamorphic grade varied along the greenstone belt frequently passing from greenschist-amphibolite to amphibolite and to amphibolite-granulite where emerald does not subsist. Malacacheta emerald at Córrego do Fogo deposit running southward for 70km, disappear at Virgolândia through the Impoçado anthophyllite asbestos deposit, returning southward to Sossêgo Farm emerald at Ferros, and more 50km southward to Capoeirana emerald deposits. The 1-2m-long and 30-40cm wide clots with emeralds irregularly set on phlogopitite has been found in several deposits, considered an enigma of formation, is described and interpreted. Emerald gem type in irregularly and non-oriented good quality crystals are disposed in phlogopitite clots similarly to boudins, formed and protected between two adjoining shear zones to open sinformal folds (F_2) refolding the similar and tight folds (F_1). Minute emerald crystals are situated within strongly foliated phlogopite (S_1) and also placed along the S_2-surface. However the emerald constrained in the S_1- surfaces does not form good quality crystals, because their size and internal fissuring. Isolate emerald as good quality crystals can be found in the intermediate zone between kinks, due to the extension produced by the F_2-fold and space generated during kink formation. The parageneses emerald-quartz-phlogopite-serpentine-talc-anthophyllite± magnesite ±garnet could be arranged in chemical potential diagrams μH_2O-μSiO_2 to establish petrogenetic grid for emerald formation and also in the system Si-Al-Mg/Ca/Na/K assembled in a triangular diagram, showing the evolution of the emerald crystallization since initial serpentine, although talc did not contribute for emerald formation.

Referencias bibliográficas

Giuliani,G., Del Rey Silva,L.J. & Couto,P.A., 1990. Origin of emerald deposits of Brazil, Mineralium Deposita, 25: 57-64.

Souza, J.L., Mendes, J.C., Bello, R.M.S, Svizero, D.P. & Valarelli,J.V. 1992. Petrographic and microthermometrical studies of emeralds in the “Garimpo” of Capoeirana, Nova Era, Minas Gerais State, Brazil. Min. Deposita, 27, 161-168.