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Corona texture in megacrystic leucogabbronorite, Western Bastar Craton, Central India: its petrogenetic significance.

Singh, H.[1], Randive, K.R[2], Korkappa, M[3]., Wankhade,S.H[4].,and Dora M.L[4].

[1]Geological Survey of India, Kolkata and Corresponding author: Harbanssingh.gsi@gmail.com
[2] Dept of Geology, RTM Nagpur University, India
[3]Geological Survey of India, NCEGR Lab, Bengaluru
[4]Geological Survey of India, Nagpur.

Corona textures, indicative of nature, direction and progress of reaction incites tremendous appeal to geologists as it gives potential insights into geological processes. Such reactions involve (partial) consumption and formation of new minerals both in radial pattern. These textures record the P–T conditions of the solidification and subsequent evolution by intrusive at deep levels of the continental lithosphere [1]. Coronas produced at magmatic stage and subsequently modified by subsolidus reactions during the post-magmatic stages of intrusive cooling [2]. Anorthosites, leucotroctolites and related gabbroic rocks commonly display late-magmatic and subsolidus reaction textures [2]. Coronas may occur as single or multiple concentric layers of different minerals.

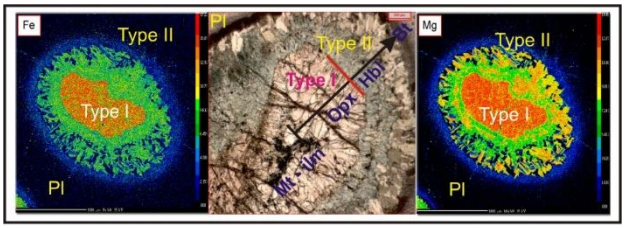

Figure 1: Corona texture, leucogabbronorite dyke, Western Bastar craton.

In the present study, multi layering (six) corona structure of different minerals between olivine and plagioclase from leucogabbronorite dyke from Gondpipri, Central India is being reported. Textural study, mineral chemistry and X-ray mapping have been used to define the possible mechanism of corona formation and its P-T condition. Plagioclase megacrysts (~4-10 cm) laden leucogabbronorite dyke, intrudes into Archaean tonalite-charnockite-enderbite of Western Bastar craton. This dyke extends for 14 Km strike length and width varying from 25 to 70 meters, occurs in parallel with nearby NW-SE trending Godavari graben. The corona mineral sequence varies in total thickness from 500 to 1000 mm comprises of both anhydrous corona type-I with orthopyroxene (Opx-symplectite) and hydrous corona type-II with amphibole-biotite-symplectite-plagioclase. Mineral reaction textures of-type I indicate an inward migration of orthopyroxene on the expense of olivine; - type II indicate the presence of an interstitial liquid trapped between olivine and plagioclase that reacts with olivine to produce a rim of green amphibole succeeded by grey and colourless amphiboles and occasionally with discontinuous shell of biotite (Fig.1). Extensive analysis of multi-layers by X-ray compositional mapping by electron microprobe (EPMA), XRD and Raman spectroscopy revealed distinct chemical variation, consistent with the formation of corona minerals at the late-magmatic stage. Variable minerals in corona are result of direct crystallization from the progressively evolved magma during cooling and preferably at low $P_{H2O.}$ The corona within plagioclase megacrysts show variable zoning and resorption near the margin. Resorption of plagioclase is attributed to melt-crystal interaction due to sudden fall in pressure during rift related dyke emplacement. The coronas developed under subsolidus conditions, via the reaction interaction of

olivine and plagioclase under the effect of an intergranular fluid. Thermobarometry studies on amphiboles yielded temperatures of 850°C and pressures of 5.01 kbar, respectively for the late-magmatic crystallisation of leucogabbronorite. In the study area spinel or garnet is not found as reaction product, which also indicates low formational pressure.

References:

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