

Uraninite-bearing leucosomes from migmatites of Chhotanagpur Granite Gneiss Complex, Karke area, Garhwa district, Jharkhand, India

Uraninite, brannerite and secondary uranium minerals have been identified by petrographical studies of the leucosome of migmatites from Karke area, Garhwa district, Jharkhand (Figure 1). Secondary uranium minerals show fine flaky nature, anomalous interference colours and medium to high density alpha tracks on CN film. The host of uranium minerals is lensoidal in nature and occurs within the melanosome part of migmatitic band in Chhotanagpur Granite Gneiss Complex (CGGC)¹. The width of migmatite varies from ~10 m to ~100 m, especially in Karke area. The migmatitic bands are flanked by pink granitoid occurring as linear body along the northern periphery. These are partially granitized metasediments and are the part of migmatites. These migmatites are hosted in biotite granite gneiss country with general trend of N65°W to S65°E, in this part of CGGC (Figure 1). A total of nine lenses of radioactive leucosome have been traced within a zone of 1000 m × 30 m trending NW–SE (Figure 2). The radioelemental distribution in these rocks is given in Table 1.

The migmatites of the Karke area represent a composite rock characteristically developed at the contact of pink granitoid and biotite granite gneiss of the CGGC. The migmatite comprises dark coloured bands of hornblende-biotite schist (melanosome) and light-coloured bands of quartz-plagioclase (albite-oligoclase) rich leucosome. Uranium mineralization is confined to leucosome; therefore, it is interpreted that the same has been generated with sodic minerals namely albite. The petrological evidence supports this observation where uraninite and brannerite are occurring together mostly within coarse grained albitic plagioclase which has recrystallized via partial melting of metasediments during migmatization (Figure 3). The mutual relationship of primary uranium minerals occurring as inclusions within one plagioclase grain indicates their syngenetic nature. Uraninite and brannerite occur with accessory minerals, viz. pyrite, zircon and magnetite. This mineralogical assemblage indicates Fe and Ti bearing

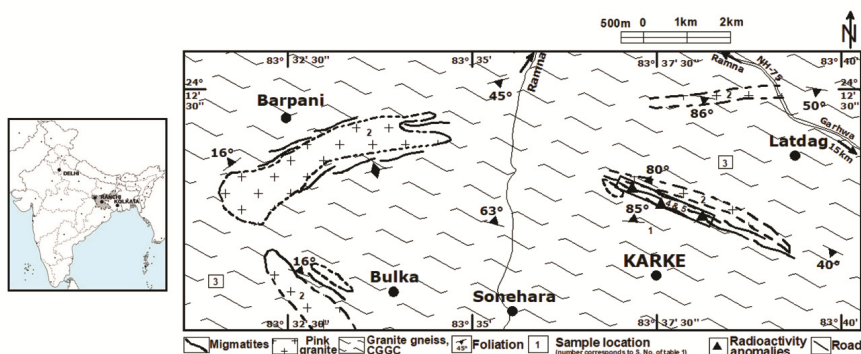


Figure 1. Geological map of Karke area, Garhwa district, Jharkhand showing location of uranium-bearing leucosome lenses in migmatite (based on district Resource Map, DGM and Toposheet No. 63 P/12).

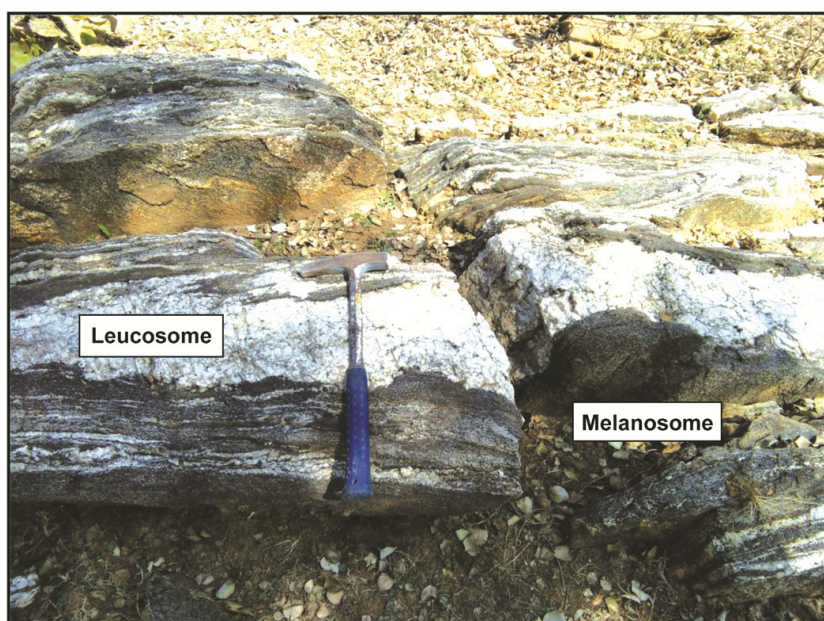


Figure 2. Exposure of uranium-bearing leucosome from migmatites (CGGC) of Karke area, Garhwa district, Jharkhand (length of geological hammer – 40.6 cm).

Table 1. Radio-elemental distribution in the rocks, Karke area, Garhwa

Rock type	n	U ₃ O ₈	ThO ₂	K
Granite gneiss	5	<0.010%	48 ppm–0.020%	<0.5%–5.1%
Pink granite	10	<0.010%	24 ppm–0.016%	2.2%–6.3%
Biotite–granite gneiss (± garnet)	10	–	<10 ppm–59 ppm	2.7%–5.5%
Hornblende-biotite Schist (melanosome)	3	–	<10 ppm	–1.8%
Quartzo-feldspathic leucosome	21	<0.010%–0.200%	<10 ppm–80 ppm	<0.5%–5.7%

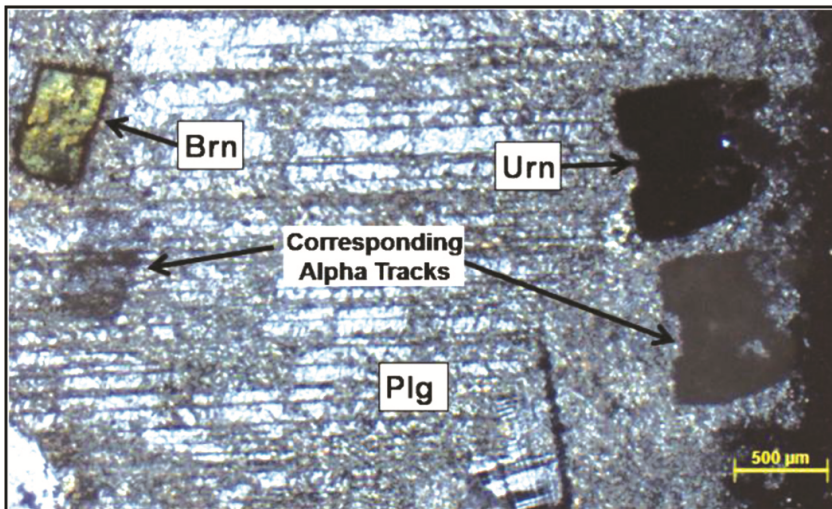


Figure 3. Photomicrograph showing euhedral uraninite (Urn) and brannerite (Brn) in leucosome from migmatite (CGGC) along with corresponding alpha tracks (TL, 2N).

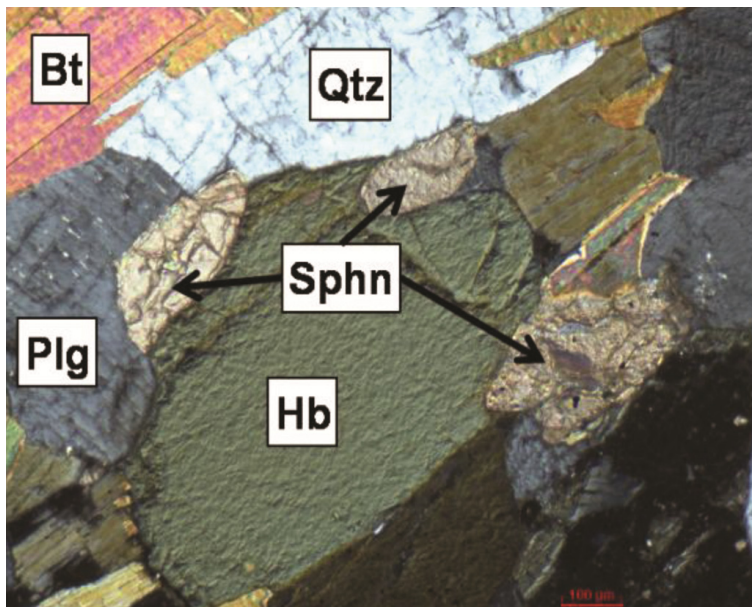


Figure 4. Photomicrograph showing hornblende-biotite schist (melanosome of migmatites), Karke area, Garhwa district, Jharkhand (TL, 2N).

alkaline solutions brought uranium into the system as a part of migmatization process (Figures 3 and 4). Presence of euhedral uraninite and their occurrence as inclusion within altered plagioclase indicate their formation at high temperature.

The CGGC, where the above occurrence has been recorded extends over

500 km in length and 200 km in width in Uttar Pradesh, Jharkhand, Bihar and West Bengal. This discovery in Garhwa district therefore has significance in the light of its location to the east of Naktu and Anjangira uranium occurrences in Sonbhadra district in similar geological setting². Naktu and Anjangira occur-

rences are situated at 90 km west of the Karke area and are presently being explored to probe the subsurface continuity of uranium in Sonbhadra district of Uttar Pradesh. The Karke uranium occurrence has confirmed continuity of similar geological environment in Jharkhand. Based on this finding of uranium mineralization, further planning of exploration in the similar geological setup would establish CGGC as potential uranium province in the country in near future.

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2. Mahendra Kumar, K., Bhattacharya, A. K., Gorikhan, A. K., Mathur, D. K. and Sengupta, B., *Exploration and Research for Atomic Minerals*, AMD, 1998, **11**, 55–60.

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