

THERMAL ENHANCEMENT OF INFERIOR QUALITY CORUNDUM VARIETY CALLED 'KIRI KOTTARA'

**W.G.C.N. Wewegedara*, N.P.W.D.S.D. Rodrigo,
A.U. Wijenayake and Prashan Francis**

*Gem and Jewellery Research and Training Institute, 73/5/A, Weliwita, Kaduwela.
chandimawgcn@gmail.com*

During gem mining, an inferior corundum variety called 'Kottara' is found in bulk quantities in the gem gravels. Among the inferior corundum variety, some are milky white in appearance known as 'Kiri Kottara'. As this material does not possess the colour or the transparency, they are mostly discarded or used as an abrasive. The aim of this study is to enhance the quality of this material by way of heat treatment.

Heat treatment was carried out in separate batches of samples subjecting to temperatures from 1600°C to 1900°C. Samples were visually scrutinized under reflected and transmitted light microscopy to determine colour and clarity. EDXRF analysis was carried out for treated and non-treated samples as a confirmatory test. Finally, the treated stones were cut, polished and set into jewellery.

Although clarity remained unchanged, the most sought after bluish colour was obtained for stone batches subjected to 1900°C followed by one hour soaking period in a reducing environment. EDXRF results confirmed that Al_2O_3 and SiO_2 were the major constituents in 'Kiri Kottara'. The precision of EDXRF is not enough to measure the trace elements. As such it was not possible to explain the charge transfer phenomena of Ti^{4+} , Fe^{2+} and Fe^{3+} ions. The research is ongoing and intended to carry out LA-ICPMS analysis for trace elements to overcome this difficulty.

Though the clarity of 'Kiri Kottara' remains unchanged the colour changed into most sought after blue colour enhancing value of the stones by several magnitudes, and the treated stones are ideal for silver jewellery intended for middle income consumers.

Keywords: Heat treatment, Charge transfer phenomena