

## Value Addition of Low-Quality Gems in Sri Lanka: A Case Study from Marapana, Ratnapura

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Sri Lanka is known the world over for its wide variety of coloured gemstones. In addition to the good quality gemstones, low-quality gemstones (Geuda) are found in Sri Lanka. Heat treatment is a physicochemical method to improve the colour and clarity of these low-quality gemstones. This study aims to conduct investigations based on chemical and spectrophotometric analysis in order to develop well-defined procedures to enhance the quality (colour and clarity) of the low-quality gemstones, namely Geuda, Ottu, Kahata and dark tourmaline. Low-quality gem samples were collected from two gem pits in Marapana, Ratnapura. Based on the initial characterisation, the gem samples were grouped in to four categories: Geuda, Ottu, Rambaha and Spinel and their weight ranged from 0.3 to 7 carots. The size of the collected gems was ranged 4 - 12 mm. Initial observations were derived by using magnifying lenses which suggested that the majority of the samples contained mineral inclusions, cracks and had a semi-transparent appearance, therefore they possessed a low commercial value in the market. Further, characterizations of the samples were subjected to determine the physical properties (refractive index and specific gravity) and chemical properties (inclusions). Spectrophotometric properties will also be determined using Raman spectrometer, X-ray fluorescence (XRF) spectrometer, X-ray diffraction (XRD) spectrometer, UV visible spectrophotometer, Fourier-transform infrared spectrophotometer (FTIR) and Laser ablation inductive couple plasma mass spectrometer (LA-ICPMS). Based on the physical, chemical and spectrophotometric properties along with the spatial data, the heat treatment will be conducted using Lakmini, tube and muffle furnaces. Heat treated sample will be further investigated to identify atomic rearrangement and also to identify optimum heat treatment conditions for low-quality gemstones.

**Keywords:** *Furnace, Heat treatment, Optimum, Properties, Spectrophotometric*

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