

A NOVEL HEAT TREATMENT METHOD TO CONVERT SRI LANKAN *DEGUNA* STONES TO *PADPARADSCHA* SAPPHIRE

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Red and blue combined *deguna* stones are traditionally being converted to pink sapphire or ruby around 1,200 °C under oxidizing ambient air condition inside the Lakmini furnace. Under these conditions, already available red tone because of chromium (Cr³⁺) ions is highlighted as fading of blue colour due to the dissociation of ferro-titanium bi-particle ([Fe.Ti]⁶⁺). The aim of this study to deduce a novel heat treatment method to convert pale reddish blue colour *deguna* stones to *padparadscha* sapphire by further oxidizing these dissociated Fe²⁺ ions in to Fe³⁺ ions. In this method, pale reddish blue colour *deguna* stones were heat treated at 1,400 °C providing 30 minutes maximum soaking period, under high oxidizing ambient air conditions inside the Lakmini furnace. The heat treatment practice was carried out using an alumina crucible with both bottom and side ventilation holes. Also, 5 °C/min heating rate and 4 °C/min cooling rate were maintained to achieve resilience of the treated stone. The mineralogical and chemical studies of yielded product were revealed that the initial pale reddish blue colour *deguna* stones have been converted to *padparadscha* sapphire or golden sapphire depending on the availability of initial elemental impurities within the corundum host of *deguna* stones. However, physical properties and internal bulk chemistry of initial stones have been remained unchanged during this heat treatment method. The change in valence stages of elemental impurities may cause the colour change from pale reddish blue colour to typical *padparadscha* colour.

Key words: *Padparadscha Sapphire, Heat treatment, Deguna stones*