

## A DETAIL STUDY ON YELLOW ZIRCONS PRODUCED FROM SRI LANKAN REDDISH-BROWN ZIRCONS BY HEAT TREATMENT

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Zircon is a common gem mineral found in gem gravel beds of Sri Lanka. Heat treatment technique is used to enhance the colour and clarity of reddish-brown zircons. The objective of this research was to study the properties of Heat-treated Yellow Zircons (HYZ) produced from Sri Lankan Reddish Brown Zircons (SLRBZ). Several SLRBZ were annealed to produce yellow colour at about 600 °C for 30 minutes soaking period. Five HYZs were randomly selected for a detail study. Specific gravity of these stones was measured which had an average of 4.4, affirms that most of them belongs to intermediate type zircon. FTIR, Raman, UV-Vis and XRF analyses were performed for further characterization. The strong hydrous component peak at 3800 cm<sup>-1</sup> and 3400 cm<sup>-1</sup>, weak banding at 854 cm<sup>-1</sup> and very poor peak at 609 cm<sup>-1</sup> in FTIR spectrum illustrates the metamictization. This was further clarified by Raman peaks, where Full Width Half Maximum (FWHM) of the 1008 cm<sup>-1</sup> peak was 20. Also, the weakening of bands between 230 cm<sup>-1</sup> to 200 cm<sup>-1</sup> and broaden width of the bands. But Geiger number in Counts Per Minute (CPM), which lies between 16 to 32 (less than 100), indicates the radiation level of HYZ is not harmful. Broad absorption band in UV region with a tail in visible region was observed in UV-Vis of the SLRBZ and it was not observed in HYZ. So, this confirms that brown colour tint has been reduced during the heating. Also, those HYZ were exposed to sunlight for two weeks and observed that there was no any loss of colour. Further mass percentage of Zr, Si, Hf, U and Th were examined and average of 72%, 25%, 1.16%, 0.06% and 0.02% were found in each of these elements respectively. Tb<sup>3+</sup> peak at 652 nm of UV-Vis and U<sup>5+</sup> peak at 6668 cm<sup>-1</sup> of FTIR was also detected. Concludingly, trace elements of Th, U, Hf and Tb were found in all HYZs. And, though HYZs are metamict, the enhanced colour is stable and they are safe to wear in jewelleryes.

**Keywords:** *Metamictization, Magmatic, Mass percentage*