An Effective Method of Conversion of Pulmoddai Zircon Sand into Zirconia

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This study describes an effective and a suitable method of converting Pulmoddai Zircon ($ZrSiO_4$) sand into Zirconia (ZrO_2). Although few other methods have been reported in the literature to do this conversion, none of them were used in Sri Lanka. This could probably be because of its ineffectiveness or high cost. The proposed conversion method is an effective and low cost method because a comparatively low temperature is used for the conversion. The beach sand at Pulmoddai consists of 65% ilmenite, 10% zircon, 10% rutile and the rest are non-heavy minerals. Zircon is an oxide ceramic material which is used in industrial applications due to its special optical, chemical, electrical, thermal and mechanical properties. Although there are valuable zircon deposits in Sri Lanka, it is a major drawback that the country still does not give any value addition to it. In this study it was revealed that zirconia can be synthesized using zircon sand which can be separated directly from raw sand. After the preliminary preparation, the zircon sand was mixed with a solution of aqueous caustic soda (NaOH) and heat treatment was conducted at comparatively low temperatures for a short period. Solvent evaporation method was used to obtain zirconia from Zirconium Hydroxide, which was obtained by mixing NH_4OH with zirconium Oxychloride crystals. The resulting powder was analysed using X-Ray Diffraction method and it was confirmed that the final product was Zirconia.

Keywords: Zircon, Zirconia