



## **Preparation of Titanium Dioxide Nano Particles from Sri Lankan Rutile Mineral Sand**

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### **ABSTRACT**

Minerals are non-renewable resources, and the problem is further aggravated due to the export of minerals in near raw form with the minimum level of value addition. Pulmoddei beach deposit contains 75%-80% of Ilmenite and 7%-8% of Rutile. Rutile is a major ore of titanium, a metal used for high-tech alloys because of its lightweight, high strength, and corrosion resistance. Owing to their high photo catalytic activity and chemical stability Nano Titanium Dioxide is used in cleaner technologies and solar energy conversions. This research is dedicated to prepare Titanium Dioxide nanoparticles from Sri Lankan Rutile sand. In the methodology, initial Rutile samples were characterized using Furrier Transform Infrared Spectroscopy (FTIR), X-ray diffraction (XRD) and X-ray fluorescence (XRF) techniques. Titanium Sulfate precursor from raw Rutile was prepared via acid leaching. Nano Titania particles were prepared via sol gel method. The prepared material was further characterized using XRD and XRF techniques. According to the FTIR graph, peaks present at 596 cm<sup>-1</sup>, 1297 cm<sup>-1</sup>, 1517 cm<sup>-1</sup>, and 3700 cm<sup>-1</sup> wave positions are corresponding to the Ti-O, Ti-OH, and Ti-O-Ti bond vibrations. Hence the collected sample is consists of Titanium dioxide. According to the XRF analysis, initial Rutile sand contains 89.50% of Titanium Dioxide. In the prepared Nano Titania material the Titanium Dioxide composition is much higher and it is 94.90%. According to it, the JCPDS card number (29-1360); (110), (111), (220) peaks are corresponding to the Rutile. It implies that the sample contains Titanium Dioxide in high purity. This novel Titanium Dioxide nanomaterial can be considered as a value added product prepared from Sri Lanka Rutile sand. Further this is intended to be utilized as a photocatalytic material as a useful application.

**Keywords:** *Rutile Sand, Titanium Dioxide, Nanomaterial*