

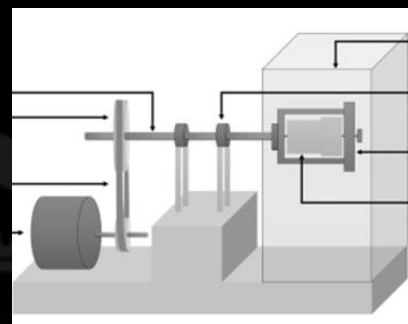
TECH BRIEF

Novel and Low-Cost Method for Converting Natural Ilmenite Present in Mineral Sands to Pure Titanium

Technical Problem: To convert mundane mineral ilmenite to highly value-added titanium dioxide nanomaterials such as nanoparticles, nanorods, nanowires, etc. using environmentally-friendly, low-temperature process in order to drastically reduce cost of production and to obtain highly value-added nanomaterials rather than micro-particles that are obtained in currently used highly costly processes.

Inventiveness: Low-cost environmental non-hazardous acid hydrothermal technique was used to break down well-structured mineral of Ilmenite, with a composition of FeTiO_3 beach mineral sands from Sri Lanka to produce nano material of titanium and iron leachate. This can be done at a relatively low temperature with saturated vapor pressure under hydrothermal conditions compare to the conventional methods.

Finely powdered ilmenite was treated with an acid under hydrothermal in a closed system using a revolving autoclave. Then respectively using co-precipitation and low temperature calcinations obtained well crystalline pure nano-particles of magnetite.



Value Propositions: The major consuming industries of TiO_2 are in the mature sectors in the developed world such as paints and coatings applications, paper and paperboard, and plastics. Therefore, the consumption of TiO_2 tends to follow general economic trends.

Global demand growth for TiO_2 is estimated to average 2.7%/year in the 10 years to 2025, according to the UK consultant Artikol. Growth will be driven by China which is estimated to grow at 5%/year. A lot of potential is also seen in India in the next 10 years.

Market Applications: Can be used as electrode materials for solar cells, photocatalysts, wide band gap materials for gas sensing, pharmaceuticals, paints, disinfectants, printing inks, fibers, rubber, cosmetic products, food, glass and glass ceramics, electrical ceramics, metal patinas, catalysts, electric conductors and chemical intermediates. The main use of titanium dioxide (TiO_2) is as a white powder pigment because of its brightness and very high refractive index and can be used for anti-fogging coatings and self-cleaning windows.