Synthesis and characterization of TiO2 nanoparticles by ball milling process: the influence of process time on the structural, optical, and morphological properties.

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**Abstract**

Synthesis of nanomaterials by a simple, low cost and in high yield has been a great challenge since the very early development of nanoscience, TiO2 nanoparticles is one of the most used metal oxides in the global nanotechnology market. In this work three different particle sizes of TiO2 nanoparticles were obtained by high energy ball milling which was performed in air using a planetary ball mill (FRITISH PULVERISETTE 7 Premium line). The starting materials were commercial TiO2 powder (Sigma– Aldrich, 99.9% purity), which were milled for 1hr and 3hr at 200 r/min. The mixture ratio of steel balls and powders was 20:1 by weight percent. The obtained nanoparticles were later analyzed by using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and Scanning electron microscopy (SEM).

**Keywords:** TiO2 nanoparticles; high energy ball milling; characterization, nanotechnology.