Synthesis of TiO₂ Nanostructures by Liquid Phase Deposition (LPD)

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Titanium dioxide (TiO₂) thin films have been synthesized using liquid phase deposition (LPD) method at a low temperature below 100 °C ^[1]. Quartz and sputtered TiO₂ films were used as a substrate for the deposition of TiO₂. The TiO₂ nanostructures have been deposited successfully onto the substrate surface via hydrolysis of (NH₄)₂TiF₆ in the presence of H₃BO₃ as a scavenger ^[2]. In order to characterize the structure and morphology of product, microscopic and spectroscopic techniques were employed. Raman Spectra confirmed the anatase phase of TiO₂. Based on scanning electron microscope (SEM) photographs, the obtained TiO₂ nanostructures are observed to grow onto the quartz substrate as a flower-like lump shape with the deposition time 180 min (Fig. 1(a)). Moreover, TiO₂ crystals grown as densely-packing islands on a sputtered TiO₂ film (Fig. 1(b)). Based on X-ray diffraction (XRD) pattern, the Debye-Scherrer equation was employed to examine the crystallite size, which revealed that TiO₂ nanostructures with longer crystallite size (2.25 nm) were synthesized on a sputtered film comparing to those on a quartz (0.71 nm). The results indicated the use of sputtered TiO₂ films as a substrate may improve the TiO₂ crystals on nanostructured film.





Fig. 1 SEM images of TiO₂ nanostructures prepared on (a) a quartz and (b) a sputtered TiO₂ substrate

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