

A Novel Fabrication of Isolated Titanium Dioxide Nanotubes

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TiO₂ nanotubes are of great interest since they show a great promise in a wide range of applications including photocatalysis, photoelectrolysis, and photovoltaics. In most cases, TiO₂ nanotubes were utilized in the form of TiO₂ nanotubes perforating on titanium substrates. For broader applications, a development of isolated TiO₂ nanotubes that are detached from titanium substrate as a new form of nanomaterials is crucial. In this work, a novel fabrication of isolated TiO₂ nanotubes is presented. Discrete TiO₂ nanotubes with a uniform size of 0.3 μm and lengths of a few micrometers were synthesized by an anodization process in diethylene glycol. Then, TiO₂ nanotubes were peeled off from titanium substrate by sonicating in isopropanol for 25 mins. As a result, isolated TiO₂ nanotubes with a perfect tubular shape were successfully fabricated. This opens up a great potential of utilizing isolated TiO₂ nanotubes for broader applications such as photocatalysis, drug delivery and nanomedicine.

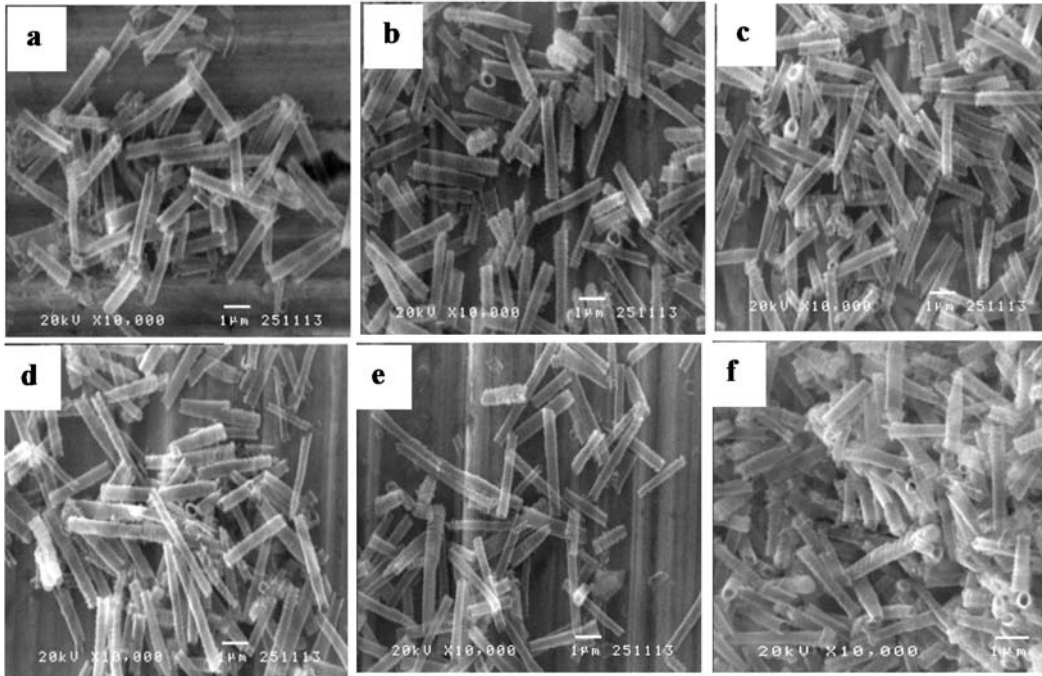


Figure 1: The SEM micrographs of isolated TiO₂ nanotubes after sonication for (a) 5 mins, (b) 10 mins, (c) 15 mins, (d) 20 mins, (e) 25 mins and (f) 120 mins