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A NOVEL SINGLE-STEP ROUTE BASED ON SOLVOTHERMAL TECHNIQUE TO SHAPE-CONTROLLED TITANIUM NANOCRYSTALS

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ABSTRACT A novel single-step route based on a solvothermal technique has been developed for the preparation of highly crystalline TiO₂ nano-crystals exhibiting different shapes such as rhombic, truncated rhombic, spherical, dog-bone, truncated and elongated rhombic. Using water vapour as the hydrolysis agent to accelerate the reaction and both oleic acid and oleylamine, which act as two distinct capping surfactants to control the growth of the TiO₂ nanoparticles, are essential features to permit the generation of uniform TiO₂ nanocrystals. Furthermore, we also show that the presence of an appropriate amount of water vapour along with the desired oleic acid/oleylamine molar ratio plays a crucial role in controlling size and shape of TiO₂ nanocrystals. These nanocrystals have potential applications as photocatalysts and photovoltaic cells.

Keywords: Nanocrystals, shape-controlled, titanium, crystal, growth, nanoparticles, photocatalyst