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Simple and fast annealing synthesis of titanium dioxide nanostructures HANSOO KIM, Texas A&M, JONGBOK PARK, YEONTACK RYU, CHOONGHO YU, MICROSCOPY AND IMAGING CENTER COLLABORATION, DEPARTMENT OF MECHANICAL ENGINEERING COLLABORATION
— Titanium dioxide (TiO_2) has been intensively studied due to its useful applications such as dye-sensitized solar cells and electrodes in lithium ion batteries. In this study diverse TiO_2 nanostructures were synthesized by a simplified synthetic method. Since it does not require a high reaction temperature or complicated processes it can be useful for producing a large quantity of TiO_2 nanomaterials at very low temperatures. Crucial synthesis conditions such as eutectic catalyst (copper), growth temperatures, and annealing time were systematically investigated. Only 30 minutes annealing at 850 °C was enough to produce densely-packed $\sim$ 10 μm long nanowires ($\sim$ 100 nm diameter), and a longer reaction time changed morphology from wires to belts. The nanostructures were identified to be rutile structure with the 110 growth direction by x-ray and electron diffraction. Our simple but effective method can be utilized for other metal oxide nanowires, especially with materials of a high melting temperature.

Hansoo Kim
Texas A&M

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