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## Control of Nanospacing in TiO<sub>2</sub> Nanowire Array Using Electron Beam Lithography

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According to advanced nanotechnology in the field of biomedical engineering, many studies of the interaction between topography of surfaces and cellular responses have been focused on nanostructure. In order to investigate this interaction, it is essential to make well-controlled nanostructures. Electron beam lithography (EBL) have been considered the most typical processes to fabricate and control nano-scale patterns. In this work, TiO<sub>2</sub> nanowire array was fabricated with hybrid process (top-down and bottom-up processes). Nanodot arrays were patterned on the substrate by EBL process (top-down). In order to control the spacing between nanodots, we optimized the EBL process using Poly(methyl methacrylate) (PMMA) as an electron beam resist. Metal lift-off was used to transfer the spacing-controlled nanodots as a seed pattern of TiO<sub>2</sub> nanowire array. Au or Sn nanodots which play an important role for catalyst using Vapor-Liquid-Solid (VLS) method were patterned on the substrate through the lift-off process. Then, the sample was placed in the tube furnace and heated at the synthesis temperature. After heat treatment, TiO<sub>2</sub> nanowire array was fabricated from the nanodots through VLS method (bottom-up). These results of spacing-controlled nanowire arrays will be used to study the interaction between nanostructures and cellular responses in our next steps.

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**Keywords:** nanowire array, electron beam lithography, vapor-liquid-solid

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## Nano Patterning Functional Polymers Using Nano-imprint Technique

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Previous studies to enhance optical properties of opto-electronic devices involve patterning of inorganic materials. Patterning of inorganic material usually encompasses vacuum process that hinders productivity and increases cost. In this research, we successfully formed nano patterns with polymer matrix and fabricated photonic crystals. This process is anticipated to increase the performance of opto-electronic devices without any vacuum process. Moreover, nano imprint technology reduces cost and bolsters productivity.

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**Keywords:** Polymer Patterning, NOA, Polysilazane, Optics, photonic crystal