

# Ultra-high-speed nanomaterial synthesis process developed using laser beams

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Dr. Jun Yeop, Yeo and the research team led by Professor Seung Hwan, Ko (both of the Department of Mechanical Engineering at KAIST) successfully developed a process enabling the location-determinable, ultra high speed synthesis of nanomaterials using concentrated laser beams. The result of the research effort was published as the frontispiece in the July 9th edition of *Advanced Functional Materials*, a world renowned material science and engineering academic journal.

Application of the process reduced the time needed to process of nanomaterial synthesis from a few hours to a mere five minutes. In addition, unlike conventional nanomaterial synthesis processes, it is simple enough to enable mass production and commercialization. Conventional processes requires [high temperatures](#) of 900~1000oC and the use of toxic or explosive vapors. Complex processes such as separation after synthesis, patterning, and etc. are needed for application in electronic devices. The multi-step, expensive, environmentally unfriendly characteristics of nanomaterial synthesis served as road blocks to its mass production and commercialization. Exposing the precursor to concentrated continuous laser beam (green wavelength) resulted in the synthesis of [nanowires](#) in the desired location; the first instance in the world to accomplish this feat. The process makes possible production, integration and patterning of nanomaterials using a single process.

Applicable to various surfaces and substrates, nanowires have been successfully synthesized on flexible [plastic substrates](#) and controlled

patterning on the surface of 3-dimensional structures. Dr. Yeo commented that the research effort has "yielded the creation of a nanomaterial synthesis process capable of synthesis, integration, pattern, and material production using light energy" and has "reduced the synthesis process time of nanomaterial to one tenths of the conventional process." Dr. Yeo continues to devised steps to commercialize the new multifunctional electronic material and methods for mass production.

Provided by The Korea Advanced Institute of Science and Technology (KAIST)

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