Synthesis and Patterning of Polymer Nanowires (#4293)

A method for the large-scale fabrication of patterned organic nanowire (NW) arrays

Georgia Tech inventors have developed a method for the large-scale fabrication of patterned organic nanowire (NW) arrays demonstrated by the use of laser interference patterning (LIP) in conjunction with inductively coupled plasma (ICP) etching. The NW arrays can be fabricated after a short ICP etching of periodic patterns produced through LIP. Arrays of NWs have been fabricated in UV-absorbent polymers, such as PET (polyethylene terephthalate) and Dura film (76% polyethylene and 24% polycarbonate), through laser interference photon ablation and in UV transparent polymers such as PVA (polyvinyl acetate) and PP (polypropylene) through laser interference lithography of a thin layer of photoresist coated atop the polymer surface.

Benefits/Advantages

- Reliable
- High-throughput
- Low-cost

Potential Commercial Applications

- Biomedical and electronic applications
- Nanotechnology
- Bioscience
- Organic light-emitting diodes (OLED)
- Sensors and field-effect transistors (FET)
- Organic solar cells

Background/Context for This Invention

One-dimensional nanomaterial devices of inorganic semiconductors and functional oxides have been studied for applications in electrics, mechanics, photonics, bioscience, and energy science. Fabrication of patterned inorganic nanowires (NW) has been widely developed via different methods, such as electron beam lithography (EBL) and nanoimprint lithography (NIL). However, none of these approaches provide a reliable, high-throughput, and low-cost solution for large-scale fabrication of patterned organic NW arrays at a level required for industrial applications.

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More Information

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Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/synthesis-and-patterning-polymer-nanowires

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot