Research advances nanowire technology for large-scale applications

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(PhysOrg.com) -- Researchers at Northeastern created a network of nanowires that can be scaled up more efficiently and cost-effectively to create displays such as the NASDAQ sign in New York City's Times Square.

Using Gallium nitride (GaN), a highly effective semiconductor material, the team created, for the first time, a horizontally aligned network of GaN nanowires, which are integral components in the development of electrical circuits in the nanoscale. GaN is currently used to create light-emitting diodes (LED) and blue and ultra-violet emitting lasers.

"Making devices that emit blue light and ultra-violet light is currently very expensive," said Latika Menon, assistant professor of physics and co-author of the study. "The horizontal structure of the GaN nanowire network will result in a more cost-effective way to advance this technology."

Electrodes allow for the flow of electricity between GaN nanowires and electrical wires, and the horizontal structure of the GaN nanowire networks are more easily attached to electrodes than vertical networks. In addition, the GaN nanowires have a cubic structure, with optical and transport properties that are more advanced than other nanowire structures, resulting in a more effective electrical circuit.

In terms of manufacturing, these horizontal network patterns can also be scaled up to large wafer sizes that are more compatible with the

technology used to integrate them into new nanoelectronic devices. These devices connect nanotechnology and electronic devices to develop smaller and less costly manufacturing processes and products.

The research, published in a recent issue of the "Journal of Materials Chemistry," was funded by the National Science Foundation (NSF) and the NSF Nanoscale Science and Engineering Center for High-rate Nanomanufacturing at Northeastern. Other Northeastern researchers participating in this project include physicist Zhen Wu, as well as Myung Gwan Hahm and Yung Joon Jung from the department of mechanical and electrical engineering.

Provided by Northeastern University