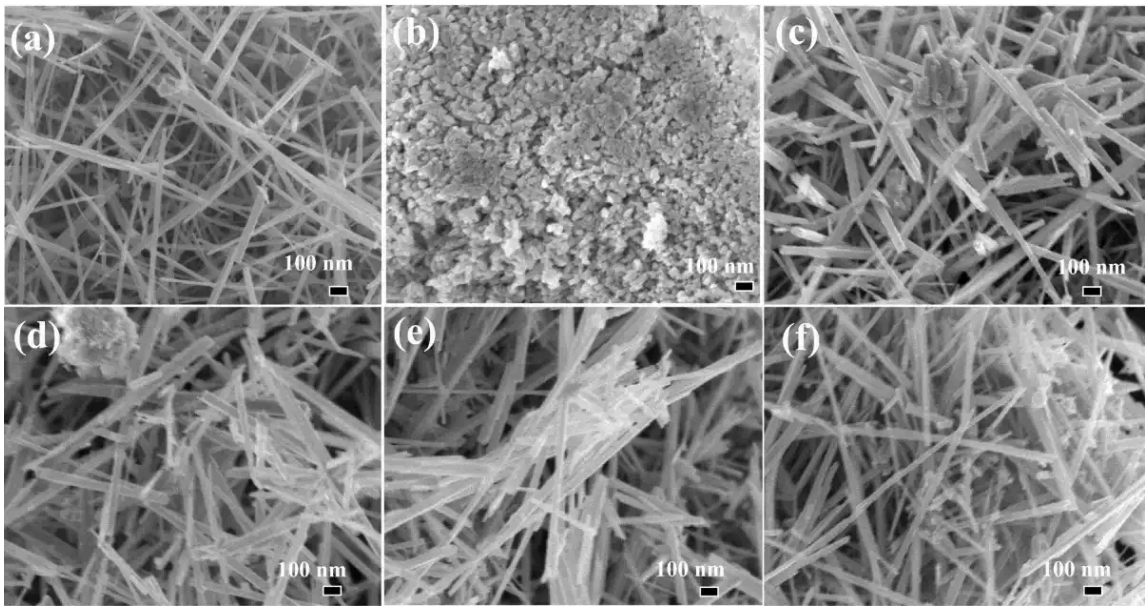
Qeios

Peer Review

Review of: "Oligophenylene vanillin nanowires exploit quantum mechanics to produce wires with a wide range of unique nanoelectric propertie"

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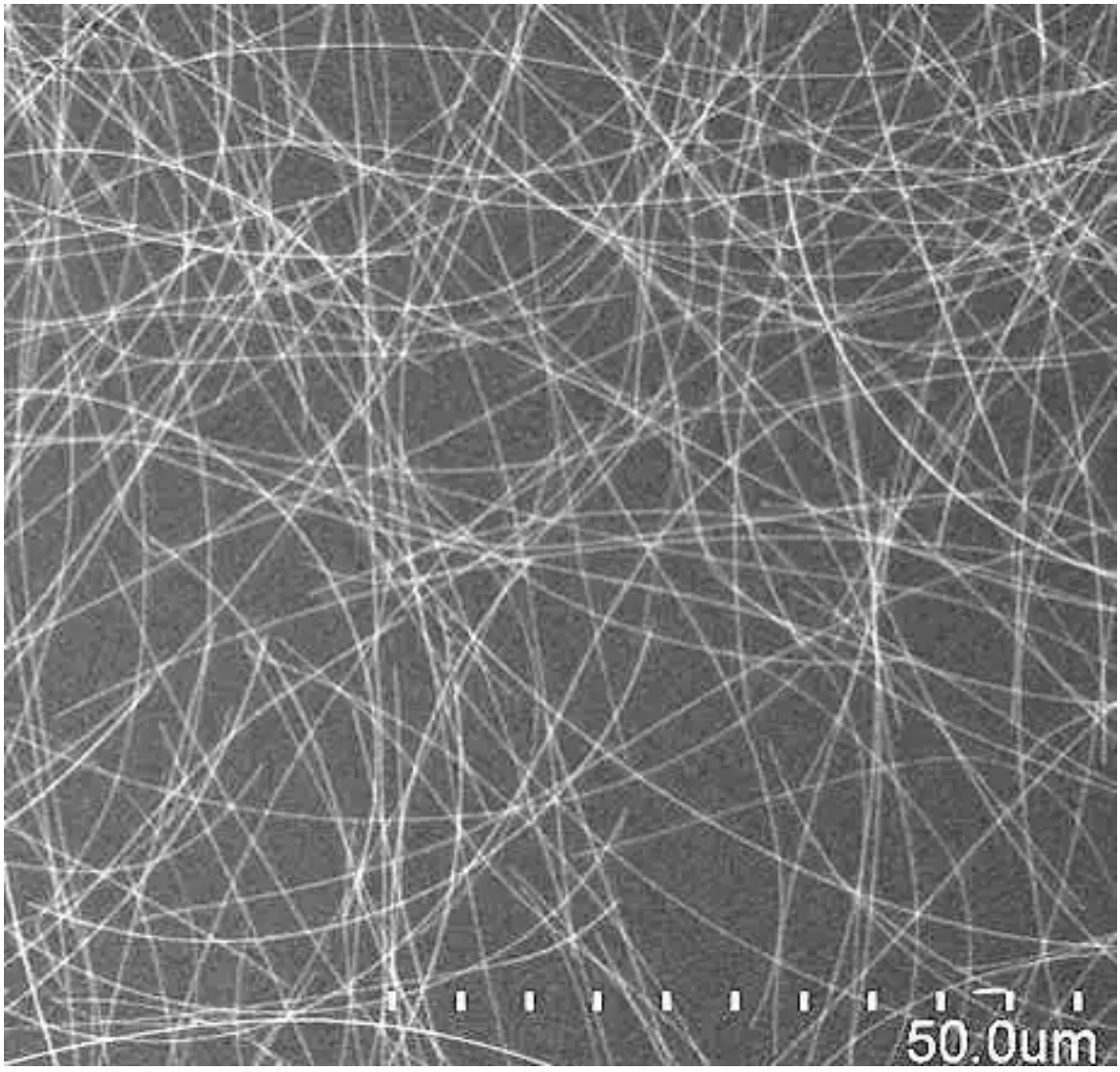
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Oligophenylene vanillin nanowires exploit quantum mechanics to produce wires with a wide range of unique nanoelectric properties. These properties include quantum tunneling, which allows wires made from carbon nanotubes to be very conductive, with electrons traveling ballistically through the wire. Nanowires have a structure that has an amazing length-to-width ratio . Oligophenylene vanillin nanowires are extremely thin - it is possible to create nanowires with a diameter of just one nanometer, nanowires are used to create the smallest transistors (nanotransistors). Oligophenylene

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vanillin nanowires can have the properties of insulators, semiconductors, or metals. Insulators do not carry an electric charge, while metals carry an electric charge very well. Semiconductors fall between the two and become charged under the right conditions. By arranging semiconductor wires in the right configuration, transistors can be made that act either as switches or amplifiers . Some of the interesting and counterintuitive properties of nanowires are due to their small scale.



Some nanowires are ballistic conductors . In normal conductors, electrons collide with atoms in the conducting material. This causes the electrons to slow down as they move, generating heat as a byproduct. In ballistic conductors, electrons can pass through the conductor without colliding. Oligophenylene vanillin nanowires can conduct electricity efficiently without generating extreme heat. By reducing the bulk volume to the size of the nanoparticle, its melting point is lowered,

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because when you reduce each particle to the nanoscale, there is a significant increase in the surface-to-volume ratio. In the fabrication and propagation of nanowires, there are top -down approaches and bottom -up approaches . A top-down approach literally means that you take a large amount of the material you want to use for the nanowires and etch it until you get the right size. A bottom-up approach is an assembly process where smaller particles join together to form a larger structure.

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Declarations

Potential competing interests: No potential competing interests to declare.