

# Chemists Devise Devises Self Assembling 'Organic Wire'

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(PhysOrg.com) -- From pacemakers constructed of materials that so closely mimic human tissues that a patient's body can't discern the difference to devices that bypass injured spinal cords to restore movement to paralyzed limbs, the possibilities presented by organic electronics read like something from a science fiction novel.

Derived from carbon-based compounds (hence the term "organic"), these "soft" electronic materials are valued as lightweight, flexible, easily processed alternatives to "hard" electronics components such as metal wires or silicon semiconductors. And just as the semiconductor industry is actively developing smaller and smaller transistors, so, too, are those involved with organic electronics devising ways to shrink the features of their materials, so they can be better utilized in bioelectronic applications such as those above.

To this end, a team of chemists at The Johns Hopkins University has created water-soluble electronic materials that spontaneously assemble themselves into "wires" much narrower than a human hair. An article about their work was published in a recent issue of the *Journal of the American Chemical Society*.

"What's exciting about our materials is that they are of size and scale that cells can intimately associate with, meaning that they may have built-in potential for biomedical applications," said John D. Tovar, an assistant professor in the Department of Chemistry in the Zanvyl Krieger School of Arts and Sciences. "Can we use these materials to guide electrical

current at the nanoscale? Can we use them to regulate cell-to-cell communication as a prelude to re-engineering neural networks or damaged spinal cords? These are the kinds of questions we are looking forward to being able to address and answer in the coming years."

The team used the self-assembly principles that underlie the formation of beta-amyloid plaques, which are the protein deposits often associated with Alzheimer's disease, as a model for their new material. This raises another possibility: that these new electronic materials may eventually prove useful for imaging the formation of these plaques.

"Of course, much research has been done and is still being done to understand how amyloids form and to prevent or reverse their formation," Tovar said. "But the process also represents a powerful new pathway to fabricate nanoscale materials."

Provided by Johns Hopkins University

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