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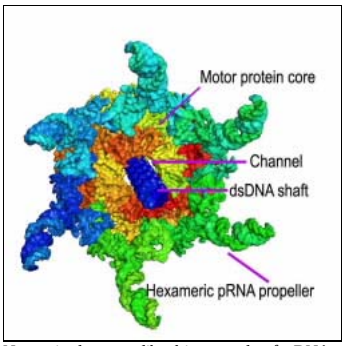
Advance could speed use of genetic material RNA in nanotechnology

"**Fabrication of Stable and RNase-Resistant RNA Nanoparticles Active in Gearing the Nanomotors for Viral DNA Packaging**"
ACS Nano



Nano-sized-motors like this — made of a DNA shaft, a protein core, and six RNA propellers — could power nanomachines so small that thousands would fit across the width of a single human hair.
Credit: Peixuan Guo, Jia Geng, and Mathieu Cinier

Scientists are reporting an advance in overcoming a major barrier to the use of the genetic material RNA in nanotechnology — the field that involves building machines thousands of times smaller than the width of a human hair and now is dominated by its cousin, DNA. Their findings, which could speed the use of RNA nanotechnology for treating disease, appear in the monthly journal *ACS Nano*.

Peixuan Guo and colleagues point out that DNA, the double-stranded genetic blueprint of life, and RNA, its single-stranded cousin, share common chemical features that can serve as building blocks for making nanostructures and nanodevices. In some ways, RNA even has advantages over DNA. The field of DNA nanotechnology is already well-established, they note. The decade-old field of RNA nanotechnology shows great promise, with potential applications in the treatment of cancer, viral, and genetic diseases. However, the chemical instability of RNA and its tendency to breakdown in the presence of enzymes have slowed progress in the field.

The scientists describe development of a highly stable RNA nanoparticle. They tested its ability to power the nano-sized biological motor of a certain bacteriophage — a virus that infects bacteria — that operates using molecules of RNA. The modified RNA sh excellent biological activity similar, even in the presence of high concentrations of enzymes that normally breakdown RNA. The finding show that "it is practical to produce (an enzyme that degrades RNA) resistant, biologically active, and stable RNA for application in nanotechnology," the article notes.

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