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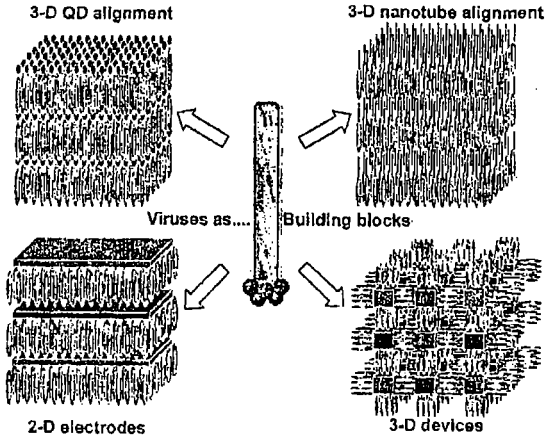
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(54) Title: MULTIFUNCTIONAL BIOMATERIALS AS SCAFFOLDS FOR ELECTRONIC, OPTICAL, MAGNETIC, SEMICONDUCTING, AND BIOTECHNOLOGICAL APPLICATIONS



(57) Abstract: One-dimensional ring structures from M13 viruses were constructed by two genetic modifications encoding binding peptides and synthesis of a heterobifunctional linker molecule. The bifunctional viruses displayed an anti-streptavidin peptide and hexahistidine peptide at opposite ends of the virus as pIII and pIX fusions. Stoichiometric addition of the streptavidin-NiNTA linker molecule led to the reversible formation of virus-based nanorings with circumferences corresponding to lengths of the packagable DNAs. These virus-based ring structures can be further engineered to nucleate inorganic materials and form metallic, magnetic, or semiconductor nanorings using trifunctionalized viruses.

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