Self-assembly of phage semiconductor nanowires

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Semiconductor and metallic nanowires have great potential as nano-electronic circuit components. The organization of nanowires into useful devices remains difficult because of problems in directing self-assembly of individual components. Biological methods of self-assembling nanowires are being explored because of the high potential for specificity, the diversity of connections, and the ease of manipulation of biological interactions. Previous work demonstrated that phage could be employed as templates for the synthesis of semiconductor and metallic nanowires. The next step is to assemble the phage nanowires into useful devices by self-assembly of individual phage. We have exploited leucine zipper interactions at the ends of the phage as a means to assemble phage into one- and two-dimensional arrays. We demonstrate the in situ organization of two different sizes of semiconductor nanocrystals into alternating linear arrays. Future work includes modifying the phage ends with trimeric leucine zippers and modulating the length of individual phage.