

## **Heterostructured 1-D Nanostructures for Catalysis**

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Nanoscale heterostructures combine different materials with different morphologies and compositions. They are of immense interest due to their unique properties and hold great promise for applications in electronics, magnetism, optical, and photocatalysis. Herein, we demonstrate two types of 1-D heterostructures including CuO nanowires decorated with  $\text{Co}_3\text{O}_4$  nanoparticles, and CNTs decorated with Nickel nanoparticles. CuO- $\text{Co}_3\text{O}_4$  1-D heterostructures were synthesized by a simple and surfactant-free method comprised of thermal growth and wet-coating. Effects of different parameters such as precursor concentration, annealing temperature, and annealing atmospheres were evaluated to understand the growth mechanism. The prepared heterostructures showed enhanced visible light absorbing and photodegradation capabilities. Another type of 1-D heterostructure contained nickel nanoparticles decorated on CNTs prepared by a single-step synthesis. Growth mechanism was extensively studied, which allow the tuning of nanoparticles density and morphologies on CNTs. The prepared 1-D heterostructures have large surface area, minimal aggregation, and unique interfacial properties, which could be widely utilized as catalysts.