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Multifunction metal oxides utilizing carbon nanotubes



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Abstract:

Multifunction metal oxides utilizing carbon nanotubes as a base template with for clean energy and other applications. In this review, we will like to show that one can utilize carbon nanotubes as a base template to support and form hybrid core-shell nanostructures, with the flexibility in the choice of shell material. With this flexibility, it effectively enhances and extends the range of applications. As the base material, there are two unique properties of carbon nanotubes which the first is its versatility in structural tubular forms and second, the possibility in enhancing the properties of carbon nanotubes itself. Several applications will also be reviewed here. For example, metal oxide tip-coated carbon nanotubes (such as MoO₃ and WO₃) have proved to be excellent schottky electron emitters while platinum coated carbon nanotubes formed excellent catalytical activity for PEM fuel cell applications. Other metal-oxide composites such as ZnO can have dual-functional properties allowing good electron emission with photoluminescence properties. We can further extend the applications into biomedical materials where carbon nanotubes can be used as the seed layer for hydroxyapatite growth. We will further show that 2D structures can be incorporated on these carbon nanotubes with clean energy applications such as PEM fuel cell and hydrogen evolution reactions.

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