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Detection properties of individual and networked CNT-ZnO-hybrid tetrapods

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Abstract:

In this work, the UV detection properties of ZnO tetrapod (ZnO-T) networks functionalized with carbon nanotubes (CNTs), as well as for individual ZnO-T-CNT are reported. The ZnO-T networks were fabricated via a flame transport synthesis (FTS) approach, while hybridization with CNTs was performed by a simple dripping procedure using a commercially available aqueous CNT dispersion (CarboByk 9810). The amount of CNT in the hybrid material was varied in the range of 0.8-4.0 wt% CNTs. While hybrid networks demonstrated inferior UV sensing performances compared to pristine ZnO-T networks, the individual ZnO-T-CNT showed more improved performances, even compared to individual ZnO-T. The fabricated microsensor showed an UV response of ~ 700 at 3 V applied bias voltage. The calculated time constants for rising and decaying photocurrent are also lower compared to individual ZnO-T. These results are quite promising for high performance optoelectronic applications, especially for UV photodetectors, demonstrating the high efficiency of hybridization.

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