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Energy Harvesting using ZnO-Based Thin Films & Nanostructures

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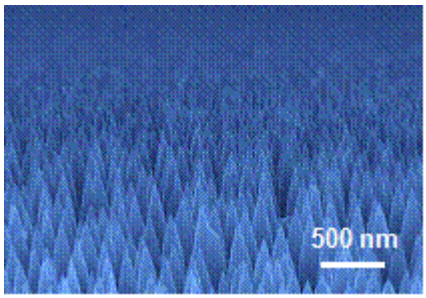
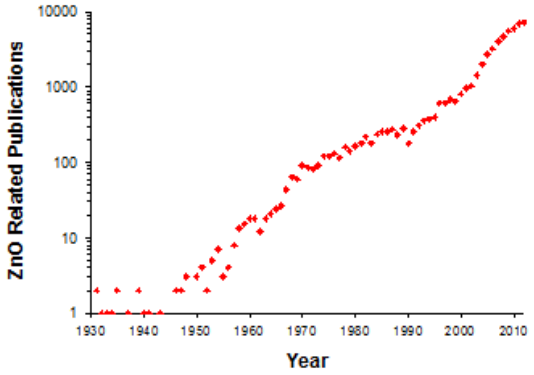


SEM Image of a Self-forming ZnO Moth-eye Nanostructure Array Grown by PLD

Zinc oxide (ZnO) is a remarkable, multifunctional semiconducting material with a direct, wide bandgap (Eg ~ 3.4 eV), intrinsically high transparency over the whole visible range, and a resistivity that can be tuned from semi-insulating right through to semi-metallic by doping. It also presents one of the highest piezoelectric responses of any semiconductor and has a relatively high thermoelectric figure of merit. Moreover, it has been judged to be biocompatible and has been approved for human consumption (in products such as vitamin pills) by the U.S. Food and Drug Administration. The figure below shows that ZnO is currently one of the hottest topics in materials science, with an enormous surge in effort and publications:



ZnO has become a hot topic because of its' distinctive property set plus a number of recent breakthroughs which predispose it for use in a whole range of energy harvesting applications from solar cells, through nanowire piezogenerators to thermoelectrics. In this talk, we will give an overview of these advances and present some of the wide range of ZnO-related devices and applications being researched at the moment with illustrations from the work of the French ZnO start-up, Nanovation (www.nanovation.com).

Keywords: ZnO, Energy Harvesting, Nanostructure, Thin Film