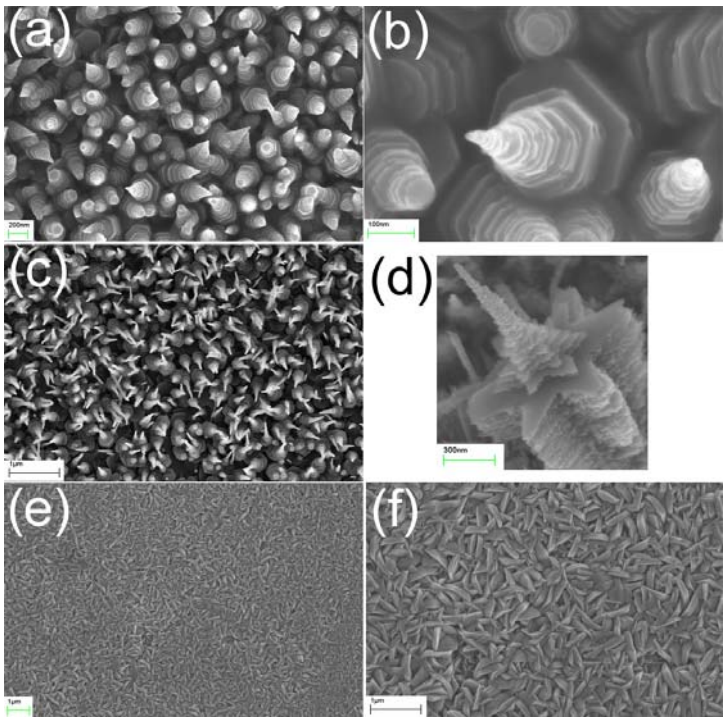
The growth and characterisation of zinc oxide nanomaterials for optoelectronic devices.

J.S. Bendall. M.E. Welland
Nanoscience Centre, University of Cambridge, United Kingdom
jsb53@cam.ac.uk

Zinc oxide is an extremely versatile material and research into it has recently undergone a renaissance as people explore its potential use in optoelectronics, gas sensor technology or electronic circuits, to name but a few. Coupled with this is the fact that it is an extremely easy material to manufacture, with several high temperature and low temperature routes available, and the reaction conditions and parameters chosen have been shown to influence the fundamental structure and properties of the final product. Any potential application of ZnO will be dependent on the final morphology of the product e.g. surface area, stochiometry, particle size, etc.

Our research is concerned with the synthesis and characterisation of zinc oxide nanomaterials, with a view to incorporating the structures into optoelectronic devices. Due to temperature restrictions from the substrate, these structures have been shown to grow at temperatures lower than 100°C from a solution based method. This renders the synthesis cheap and easily reproducible. Furthermore, by altering reaction conditions one can gain full control of the size and shape of nanoparticles obtained. We have demonstrated that, by utilising and adapting the reagent chemicals and conditions, we can get full control of the size and shape of nanostructure formed in the secondary growth regime. This can be explained in terms of the polarity and activity of the wurtzite crystal faces. Furthermore, we can utilise many of our synthesis techniques in the production of novel optoelectronic devices.



ZnO nanostructures from solution growth methods.