

Featured issue: zinc oxide

Arthur Willoughby

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In the first two issues of 2012 we are highlighting fields which are topics of particular current interest in our discipline. Following the January 2012 issue which featured ‘Lead-Free Solder and Packaging’ we now highlight another important topic in our discipline which attracts much current research—Zinc Oxide.

While this II–VI semiconductor has been known for many years, the modern appreciation of its potential began in the 1950’s, utilising properties such as piezoelectric, luminescent, and UV absorption characteristics, as well as its semiconductor features. The growth of single crystals facilitated the development of devices such as piezoelectric transducers, strain gauges, and pressure sensors, in addition to earlier devices such as varistors.

Further work on the growth of large single crystals was stimulated by the potential for lattice matched epitaxial growth of optoelectronic III–V nitrides, but more recently

it has become apparent that ZnO might be a good optoelectronic material on its own account, owing to similarities with GaN. Having a similarly wide band-gap, and similar lattice dimensions, the key advantageous feature of ZnO is that it has a free exciton binding energy of 60 meV, more than twice that of GaN. This combination offers the possibility of UV laser action at room temperature, and has given rise to much research to address outstanding problems, including that on doping and thin film growth by several different growth techniques. Further work is also pursuing the potential of ZnO-based dilute magnetic semiconductors in spintronics.

Interest in this subject has led to this Featured issue from papers submitted as regular submissions. We hope you will find this issue of interest, and that it will help to guide further work on this important topic.

A. Willoughby (✉)
Southampton, UK
e-mail: A.F.Willoughby@soton.ac.uk