

ICNDST & ADC 2006 Presents Latest Research in Diamond and Related Materials

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The joint International Conference on New Diamond Science and Technology and the Applied Diamond Conference (ICNDST & ADC 2006) was held in Research Triangle Park, North Carolina, May 15–19, 2006. The joint conference brought together more than 230 researchers from 18 countries to explore the latest discoveries, advances, applications, and technology developments involving diamond and related materials. The joint conference included oral and poster presentations and exhibitor displays. ICNDST & ADC 2006 was chaired by Robert J. Nemanich of North Carolina State University and co-chaired by Jeffrey T. Glass of Duke University.

The conference presented a special session on technology development and transfer, where leading materials researchers described the challenges they faced in developing new products based on diamond and related materials. J. Carlisle of the newly formed Advanced Diamond Technologies began the session with a description of the company's plans for a series of products based on nanocrystalline diamond films, and S. Coe of Element Six described the development of product specifications and manufacturing processes to meet cost and yield targets for high-end audio speaker components. P. Doering of Apollo Diamond described the relationship of chemical vapor deposition diamond growth technology for synthetic gems and substrates for diamond electronics. He said that single-crystal diamond substrates may be possible in the not too distant future. J. Zimmer of sp3 Technologies said that the high thermal conductivity of diamond-coated silicon substrates could be critical for solving the heating problems presently limiting silicon integrated circuits.

A specific focus of the conference was on carbon-based nanotechnology developments. B. Hinds (Univ. of Kentucky) began the sessions with a description of how functionalized carbon nanotubes could be incorporated into films to act as selective biofilters and how the flow of liquids through the nanotubes was much greater than predicted by traditional models of fluid flow.



Researchers discuss developments involving diamond and related materials during a poster session at the joint International Conference on New Diamond Science and Technology and the Applied Diamond Conference (ICNDST & ADC 2006), held May 15–19, 2006.

Several sessions focused on the excellent mechanical and low-friction properties of diamond and diamond-like carbon films, which could enable a new microelectromechanical systems technology (avoiding "stiction") or even nanofluidics. Presentations on theoretical and experimental work explored the low-friction properties of the films. Sessions on biological and medical applications explored functionalized surfaces of diamond films, nanometer-sized diamond particles, and carbon nanotubes.

A session on energy applications highlighted the potential for carbon-based materials for thermionic energy conversion, which could be more efficient than traditional thermoelectric materials. Diamond- and nanotube-based field-emission devices were described, with potential applications as a localized x-ray source and high-power or high-frequency electronics. Advances in phosphorus *n*-type doping of diamond on (100) surfaces should enable the development of *p*-*n* junction devices. Field-effect transistors based on surface conductivity of

diamond are proving to be highly stable and effective as biochemical sensors.

During the closing session, it was announced that the ICNDST and ADC conferences will be permanently joined in the future with a new name: The Pan Pacific Conference on New Diamond and Nano Carbon (NDNC). The next conference will be held in Osaka, Japan, in June 2007.

The conference chairs and the attendees recognized the Materials Research Society for managing the operations and gratefully acknowledged the support of the conference co-hosts and sponsors.

The joint conference was co-hosted by North Carolina State University, Duke University, and Vanderbilt University; and sponsored by Apollo Diamond, Elsevier, Horiba Jobin Yvon, the Japan New Diamond Foundation, and Seki Technotron.

ROBERT J. NEMANICH, Chair
JEFFREY T. GLASS, Co-Chair



Preregistration opens early September!

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