

## BIRCK NANOTECHNOLOGY CENTER ESTABLISHED MARCH, 2001

As one of the first academic nanotechnology research centers in the US, the Birck Nanotechnology Center provides solutions to challenges in healthcare, information access, energy, and the environment. In providing leading facilities and instrumentation for research at the nanoscale in a collaborative setting, the Center prepares the next generation of scientists and engineers to contribute to the formation of new industry in Indiana, the Midwest, and the nation, thereby strengthening the world's economy.

### Historical Accomplishments

Construction of the Center facility began in June 2003, occupancy began in September 2005, and equipment installation was completed in December 2006. Dedicated on October 8, 2005, the following donors were in attendance: Mike and Kay Birck; Don and Carol Scifres, and Bill and Mary Jane Elmore, three couples who collectively contributed \$42 million toward building construction.

**The \$58M BNC facility** is one of the largest and most comprehensive academic nanotechnology centers in the US; the 187,000 sq.ft. building includes a 25,000 sq. ft. cleanroom that is 45% Class 1, the first bio-pharma cleanroom integrated into a nanofab cleanroom, and 22,000 sq.ft. of specialized labs outside the cleanroom. The BNC was named "Facility of the Year" in 2007 by *Controlled Environments Magazine*.

**The BNC community** includes over 160 Purdue faculty, 45 of whom have offices in the facility. 20 of the 30 resident faculty members who occupy primary offices in the BNC were recruited to Purdue since 2002. The BNC also houses ~220 graduate students from 12 academic disciplines, as well as ~30 support staff (business, clerical, and lab). All equipment in the facility is shared, and labs are designated by function rather than assigned to faculty.

**Major research centers** during the early years of the BNC: NASA Institute for Nanoelectronics and Computing (INaC), closed Winter 2007; NSF Network for Computational Nanotechnology (NCN), renewed Fall 2007 (joint with Cyber Center); NIH Nanomedicine Development Center (lead transferred to U. Cincinnati in 2007).

**Research strengths** (and self-assessment): nanoelectronics (top tier), nanophotonics (top tier), computational nanotechnology (top tier), MEMS/NEMS (probably top 15, and moving up), nano/bio (strong, but fragmented; recent faculty losses; great upside potential), nanomanufacturing, materials and metrology

(broad strength, but lacking a national center), energy conversion (growing; would benefit from hiring at the senior level).

### Significant Activities of the last 12-18 months

**New Centers Awarded:** DOE/NNSA Center for Predictive Reliability, Integrity, and Survivability of Microsystems (PRISM), awarded Spring 2008 (joint with Energy Center); SRC NRI Midwest Institute for Nanoelectronics Discovery (MIND), awarded Spring 2008 (lead: Notre Dame).

Peer-reviewed Publications were used as a metric to measure the **impact of the investment in Nano** at Purdue University: Among all US universities with established nano programs in 2002, Purdue has shown the greatest percentage increase in publication numbers from 2002 to 2007 (242%); during this period, Purdue has moved from 15th to 7th in "nano-" publications among all US universities; Joint publications among Center research groups increased by a factor of three between 2005 (virtual center) and 2007 (shared physical space).

### Future Opportunities and Aspirations

*Aspiration:* to be widely regarded as among the top three US academic nanotechnology research programs within the next five years, known particularly for translation of nanoscience and nanoengineering into nanotechnologies that address national and global challenges and opportunities.

*Opportunity:* Integration of the theory and simulation researchers into or adjacent to the physical space of the BNC.

*Opportunity:* Enhanced collaboration between scientists and engineers in the BNC, particularly at the frontier between nanotechnology and biology.