UC SANTA BARBARA

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National Science Foundation Picks UCSB for New Chemical Bonding Center

A new research center at the University of California, Santa Barbara, named the Chemical Design of Materials Center, is being established by the National Science Foundation (NSF). Headed by Nicola A. Spaldin, associate professor of materials at UCSB, the center is one of the first of three Chemical Bonding Centers (CBC) funded by NSF.

Each of these multi-faceted research groups will each tackle a "big problem" in chemistry, in an atmosphere that's intended to be flexible, tolerant of risk, and open to thinking far outside the box.

According to the NSF announcement of the new centers, each award provides $1.5 million to the CBC over a three-year period. At the end of that time, those centers showing high potential will be eligible to continue their work with a Phase II award, which will provide $2 million to $3 million per year for up to five years.

These awards are also potentially renewable for an additional five years.

In addition to the center at UCSB, the new Chemical Bonding Centers (CBCs) will be based at the Massachusetts General Hospital and the University of Washington. Their respective goals are to carry out the rational design of materials having new

kinds of electrical, magnetic, and optical properties; to synthesize artificial chemical systems that can undergo Darwinian evolution; and to explore new kinds of "green chemistry," in which materials can be synthesized on an industrial scale using environmentally friendly methods.

The CBC program was inspired by concern in the scientific community that the NSF has played it too safe with chemistry, say foundation officials---a perception that proposals for high-risk, high-payoff research have too often lost out to proposals for more of the same.

So with this initiative, says Philip B. Shevlin, one of the NSF program officers who manage the CBC program, "we wanted to encourage very talented people to attack major problems that would engage the public and have a long-term societal benefit---and that would not be what they were already doing."

The Chemical Design of Materials Center, led by Spaldin, will include work with chemists and materials scientists from UCSB as well as the University of Houston, Ohio State University and Carnegie Mellon University. Rational design is a dream for materials researchers, in the sense of starting from a set of specifications---"I want a material with properties A, B, and C"---and then systematically working out what the material should be, and how to make it. Spaldin and her colleagues hope to realize that dream---especially when it comes to "multifunctional" materials such as, say, magnets that respond in novel ways when exposed to light. In phase I of the project, the CBC team will first try to gain a better understanding of chemical bonding in solids, and then use that knowledge to create new materials with interesting electrical and magnetic properties. Finally, they will attempt to combine these new materials into rationally designed "smart" materials---that is, substances that can change and respond in useful ways to environmental stimulation. In addition, this CBC will conduct an extensive outreach program designed to enhance the public's appreciation of chemistry as a major driving force in modern innovation.

Since problems like this will almost always require many investigators and many kinds of expertise, adds Shevlin, he and his colleagues also looked for a new level of agility and flexibility in each of the centers' organization. "So if the research leads off in unexpected directions," he says, "the groups should be able to change personnel as needed, and bring in new kinds of expertise."

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