

Director's Message

The Center for Superconductivity Research (CSR) at the University of Maryland was conceived in 1989 as an interdisciplinary center devoted to fundamental and applied research on superconductivity. Since then the CSR has evolved into an interdisciplinary research center that could more appropriately be called a “Center for Superconductivity, Novel Materials and Nanoelectronics”. This evolution has occurred as our outstanding faculty have moved into other areas at the forefront of research related to superconductivity.

The main themes of our research at the present time are:

1. Fundamental studies of high- T_c superconductors and other highly correlated electron materials
2. Quantum computation and coherence
3. Nanoelectronics, nanomaterials and mesoscopic physics
4. Scanning probe microscopy (primarily SQUID and Microwave)
5. Spintronics, ferroelectrics, and optoelectronics (materials, basic physics and devices)

Our research impacts technology that is important for commercial and defense related applications, such as communications, digital and analog electronics, sensors, and computers. The experimental and theoretical research programs at CSR are carried out by approximately 20 scientists and engineers of whom 10 are also teaching faculty members of the Department of Physics, Electrical Engineering, or Materials Science and Engineering. Approximately 30 graduate students are working on their research dissertation projects with members of the CSR faculty. A significant number of undergraduate students and visiting scientists also participate in research projects.

The impact and productivity of the CSR over the past 10 years has been quite significant. One important measure of this impact is the large number of citations to CSR publications (over 16,000) since 1994! A few other examples of CSR impact are:

1. Publications (451) and citations (3853) for FY 99-03
2. Invited talks (337) for FY 99-03
3. Patents awarded (21) since FY 1994 (28 more pending)
4. Annual external support of CSR research programs for FY 04 of \$4.7 million, a 15% increase over our average annual funding for FY 99-03
5. Two companies founded by our faculty based on technology invented in the CSR

Our publication, invited talk and patent contributions for FY 04 have continued at our previous levels (see the following pages of this annual report). In addition, the CSR has established joint science and technology programs with industry and government laboratories. Many of our patents have been licensed to companies for product development and royalties continue to be returned to the University and the inventors.

One important goal of the CSR is to train students with the expertise necessary to make contributions to advancing technology in the State of Maryland and elsewhere in the United States. The CSR provides a unique interdisciplinary education that gives our students a diversity of experimental skills as well as a broad and flexible

perspective of how scientific knowledge can be used to impact technological development. The average number of graduating Ph.D.s has been about six per year since 1994. Our Ph.D. (and M.S.) graduates have found rewarding positions with industry, government laboratories, and universities.

FY 04 was a productive year for the CSR although tempered by the state budget cuts of the past few years. The details can be seen at our website www.csr.umd.edu. One negative note is the departure of two of our most outstanding faculty (Webb and Ramesh) to other universities. While this will cause a noticeable drop in our research productivity unless we can hire faculty of similar quality, we feel it should be viewed as an opportunity to continue to build excellence in a center that has already excelled.

Richard L. Greene
Director