

**STEVENS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING**

Wednesday March 1, 2006
Carnegie Bldg, Room 315, 1:30 pm

**Piezoelectric Ceramic Fiber Composites That Harvest Waste Energy to
Power Electronic Systems Eliminating the Need for Batteries**

Richard “Bud” Cass

President, Advanced Cerametrics, Lambertville, NJ

Advanced Cerametrics (ACI) has developed a process to make ceramic fibers from nearly any ceramic material. The breakout use of the ceramic fibers is energy harvesting/active structural control using local sources of energy as the source of power and the piezoelectric effect. Several applications will be described and demonstrated, such as creation of light directly from mechanical energy with no intervening electronics; self-powered/self-diagnostic bearings; powering of a small computer from compression or flexural energy; and powering an LCD clock for over 20 hours from 13 seconds of a 25 Hz vibration. Additional applications include wireless sensor nodes to provide information about the condition or health (mechanical or human) of the observed system without the use of polluting, inconvenient and heavy batteries or expensive and labor intensive power connections and wiring, self-powered structural control to reduce vibration and noise, and smart prosthetics and self-powered electronic systems (e.g., replace the battery in toll road transponders).

Head Sport has used this technology for the last four years as the basis for its flagship products, founding their “Intelligence” and “Protector” lines of smart sporting goods (among others, Andre Agassi uses them and the rackets were among the best selling in the world last year). National publications have recognized ACI’s fiber composite products, including: Time Magazine’s Coolest Inventions for 2002; Fortune Small Business Magazine “Hottest Start-Ups for 2003”; and R & D Magazine “R & D 100 award” in 2004. The Navy and DARPA have featured ACI and this technology in their 2004 and 2005 Success Story publications.

Mr. Cass holds 15 patents and has several pending and has been an author and invited speaker numerous times at locations around the world on topics ranging from advanced materials to dealing with government laboratories. He has been appointed by former Governor Whitman to serve on the Prosperity New Jersey Commission and is President of the AACCMCI Corporation (Association of American Ceramic Component Manufacturers, Consortium I), which is developing ceramic compaction computer modeling software in cooperation with Sandia and Los Alamos National Labs and five advanced ceramic manufacturing companies. Mr. Cass has recently been named to the Board and has been appointed Chief Technical Officer of KSA Sports Group, a company developing wireless scoring apparatus for contact sports. Mr. Cass is a Director of the North Central Campus for Emerging Technology in Ohio.