

Fuel-powered and Electrically-powered Artificial Muscles Using Carbon Nanotubes and Shape Memory Alloys



Dr. Ray Baughman
Professor of Chemistry
Director of NanoTech Institute
University of Texas at Dallas

Humankind has had little success in replicating the wondrous properties of natural muscle, which has meant that the most advanced prosthetic limbs, exoskeletons and humanoid robots lack critically needed capabilities. The use of electrical input power, instead of nature's choice of high energy density fuel, is a problem for autonomous operation, severely limiting operational lifetime between recharges. Another problem is the inability to place sufficient motors into available space to provide natural movement. In this presentation, Dr. Baughman will describe a host of chemically-powered and electrically-powered artificial muscles that use actuator strokes generated by either carbon nanotubes or shape memory materials. The newest of these carbon nanotube artificial muscles provides more than 3X actuator stroke, a stroke rate of over a 10^4 %/second, and operates from near 0° K to far above the demonstrated 1900° K.

Ray Baughman became the Robert A. Welch Professor of Chemistry and Director of NanoTech Institute at UT Dallas in August 2001, after 31 years in industry. He is a Member of The National Academy of Engineering and the Academy of Medicine, Engineering and Science of Texas; a Fellow of the American Physical Society; an Academician of The Russian Academy of Natural Sciences; an Honorary Professor of three universities in China; and is on editorial and advisory boards of *Science*, the *International Journal of Nanoscience*, and the *Encyclopedia of Nanoscience and Nanotechnology*.

Dr. Baughman has 58 US patents and over 290 publications with over 11,500 citations. He has received the Chemical Pioneer Award from the American Institute of Chemists (1995), the Cooperative Research Award in Polymer Science and Engineering (1996), the New Materials Innovation Prize of the Avantex International Forum for Innovative Textiles (2005), Nano 50 Awards from *Nanotech Briefs Magazine* for Carbon Nanotube Sheets and Yarns (2006) and for Fuel Powered Artificial Muscles (2007), the NanoVic Prize from Australia (2006), the *Scientific American Magazine 50* recognition for outstanding technological leadership (2006), the CSIRO Metal for Research Achievement (2006), Chancellor's Entrepreneurship and Invention Award (2007), 21 for the 21st Century award (2007), the Alumni Distinguished Achievement Award of Carnegie Mellon University (2007) and the Kapitza Metal of the Russian Academy of Natural Sciences (2007).

3:30 pm - 4:45 pm, November 18
105 Nedderman Hall

RSVP: Thanh Bui at tbui@uta.edu or 817-272-1536

