



Department of
Polymer Science
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Biography: Professor Darrell Reneker began working on polymer physics at the Dupont Company in 1959, after receiving his Ph.D. degree in Solid State Physics from the University of Chicago for research on electrons in semi-metals. He holds a B.Sc. degree in Electrical Engineering from Iowa State University.

In 1969 he joined the National Institutes of Standards and Technology (NIST) and became manager of the Center for Materials Science. He served as Executive Secretary of the Committee on Materials of the White House Science Office. Reneker came to the University of Akron as Professor of Polymer Science and Director of the Institute of Polymer Science of the University of Akron in 1989.

Accomplishments: He discovered a family of crystallographic defects that transport and rotate a polymer molecule along its axis, in a chain folded polymer crystal, and stimulated world-wide interest in the use of nanofibers made by electrospinning.

Awards: Silver Medal Award from the Department of Commerce and a Senior Executive of the U.S. Civil Service. At the University of Akron, he was awarded Outstanding researcher (2002), Order of the Phoenix (2009), and Distinguished Professor (2011). Elected fellow of National Academy of Inventors (2013).

Research Interests:

Polymer morphology and electrical properties, including electromechanical effects. Atomic scale structure by low dose, high magnification, electron microscopy of thin self-supporting polymer nanofibers made of electrospinning, carbon fibers from mesophasepitch, solar sails made of nanofibers.

Industrial Sector Focus:

Thin, high surface area polymer nanofibers, biomedical applications of nanofibers, filters for efficient capture of small particles and droplets, nanofiber assemblies, energy conversion

Unique Laboratory Facilities:

Nanofiber manufacture by electrospinning and gas driven methods. Doppler velocimeter and tensile tester for single nanofibers. Three dimensional, time resolved polarized optical microscopy. Biomedical and filtration applications of nanofibers. Gas driven process for low cost carbon nanofiber production. Equipment to observe corona discharge around the jet during electrospinning.

Recent Publications:

1. Alper Buldum and Darrell Reneker, Fullerene-porphyrin supramolucular nanocables, *Nanotechnology* 25, 235201, **2014**
2. Zhenxin Zhong, Jane Howe, and Darrell Reneker, Molecular scale imaging and observation of electron beam induced changes of polyvinylidene fluoride molecules in electrospun nanofibers, (Feature Article), *Polymer*, DOI.org/10.1016/j.polymer.2013.03.056, **2013**
3. Alexander L. Yarin and Darrell H. Reneker, Electro spinning Jets and Polymer Nanofibers, (Feature Article), *Polymer*, Volume 49, Issue 10, Pages 2387-2425, DOI:10.1016/j.polymer.02.002, **2008**
4. Jukuan Zheng, Kaiyi Liu, Darrell H. Reneker and Matthew L. Becker, Post-Assembly Derivatization of Electrospun Nanofibers via Strain-Promoted Axide Alkyne Cycloaddition, *Journal of the American Chemical Society*, dx.doi.org/10.1021/ja307647xJJ. *Am. Chem. Soc.* 134, 17274-17277, **2012**
5. Rafael E. Benavides, Sadhan C. Jana and Darrell H. Reneker, Nanofibers from Scalable Gas Jet Process, dx.doi.org/10.1021/mz300297g | *ACS Macro Lett.*, 1, 1032-1036, **2012**
6. Kaiyi Liu, Camden D. Ertley, Darrell H. Reneker, Interpretation and use of glints from an electrospinning jet of polymer solutions, *Polymer* 52, 4241-4253, DOI.org/10.1016/j.polymer.2012.06.009, **2012**

Patents:

1. Polymer NO donor predrug nanofiber coating for medical devices and therapy, US Patent 8,298,563, 2012.
2. Nitric oxide-modified linear poly(ethyleneimine) fibers and uses therefor, U.S. Patent 6,855,366, 2005.
3. Process and apparatus for the production of nanofibers, U. S. Patents 6,695,992, 6,520,425 and 6,382,526, 2004, 2003 and 2002, respectively.
4. He has published over 175 papers and has over 18 US patents issued.