Outreach Activities

Reaching the broader community: middle school, high school and general public.

One of our main educational goals is to broaden the impact of our research by providing novel educational experiences to middle and high school students, science teachers and the general public. For example, we have established a collaboration with the Center for Engineering Education Outreach at Tufts (CEEO), and have already recruited two local high school teachers. These teachers will be spending one month every summer during the next three years and they will be accompanied by several of their students. The main goal is to develop material for incorporating new biophysics and nanoscience activities into the high-school science curriculum.

Our group has also participated in an NSF-sponsored summer internship for deaf and hard-of-hearing students conducted by Prof. P. Cebe. This program recruits hard-of-hearing freshmen from many different universities and colleges in US, for 1 1/2 month summer internship which comprises both classroom learning and laboratory exercises, all of which are taught by Tufts University faculty. In the laboratory portion, the students gain hands-on experience in making, characterizing, and analyzing physical properties of polymers using various techniques. Our group contribution to this program was to exemplify the use of the Atomic Force Microscope for characterizing biological materials and material surfaces. We had a great time interacting with the students from this program and are looking forward to participate in this collaboration next summer!

At the broadest level, our group is committed to integrating nanoscience and biophysical techniques (Atomic Force Microscopy, Scanning Probe Microscopy, Fluorescence Spectroscopy etc.) data into talks, demonstrations and educational videos, with the aim of educating a new generation of scientists, students and the general public about fundamental concepts and new developments in biological physics, biomedical engineering and nanotechnology. The emphasis in all these presentations is on the physical principles underlying biological or nanoscale phenomena. As part of our collaboration with the C CEO at Tufts we explore how to modularize the tools and teaching for use in the outreach activities. For example, one main program in C CEO (called Student Teacher Outreach Mentorship Program, STOMP) is to partner pairs of fellows (Tufts students) with K-12 teachers in the Boston area to create a curriculum that reaches across disciplines, peaks the students’ interests in science, and improves the students’ problem-solving skills. For example, Elise Spedden, one of the graduate students working in our group, participates in the STOMP outreach activities, where she is actively engaged in the design and implementation of new teaching experiments based on her own research. For example, during the past year she has traveled about 50 times to the Argenziano School and Healey schools in Somerville, where she has worked with middle school students on developing simple hands-on demonstrations and presentations of basic concepts in AFM and nanotechnology.

In addition to the information on our group’s website, we are presently working on developing a website as well as educational videos for the general public interested in biological physics and nanotechnology. All content will be available through YouTube (video material) and the Open Course Ware (OCW), a web based publication of educational materials which provides open, free access to high quality course content to educators, students and general public across the country. OCW is now receiving more than 600,000 visits annually. This dissemination will enable us to receive feedback not just from Tufts students and faculty, but from the wider scientific community. We are currently collaborating with Robin Smith, the OCW editor and curricular specialist on evaluating this material as well as our up-coming videos. For example, the video on AFM nanografting (created entirely by Dan Rizzo and Ross Beighley, two undergraduate students working in our group) was posted on YouTube in the summer of 2012 and has so far over 400 views (see the link to this video: Educational AFM video).