2014

R. L. McCrory Professorship

Robert L. McCrory (left) and Riccardo Betti (right)

Medal presented to Professor Robert L. McCrory and Professor Riccardo Betti

At an installation ceremony on 3 April 2014 Dr. Robert L. McCrory, University Vice President and Vice Provost, and CEO and Director of the Laboratory for Laser Energetics, was appointed University Professor. Riccardo Betti, professor of mechanical engineering and of physics and astronomy at the University of Rochester, was named the inaugural Robert L. McCrory Professor.

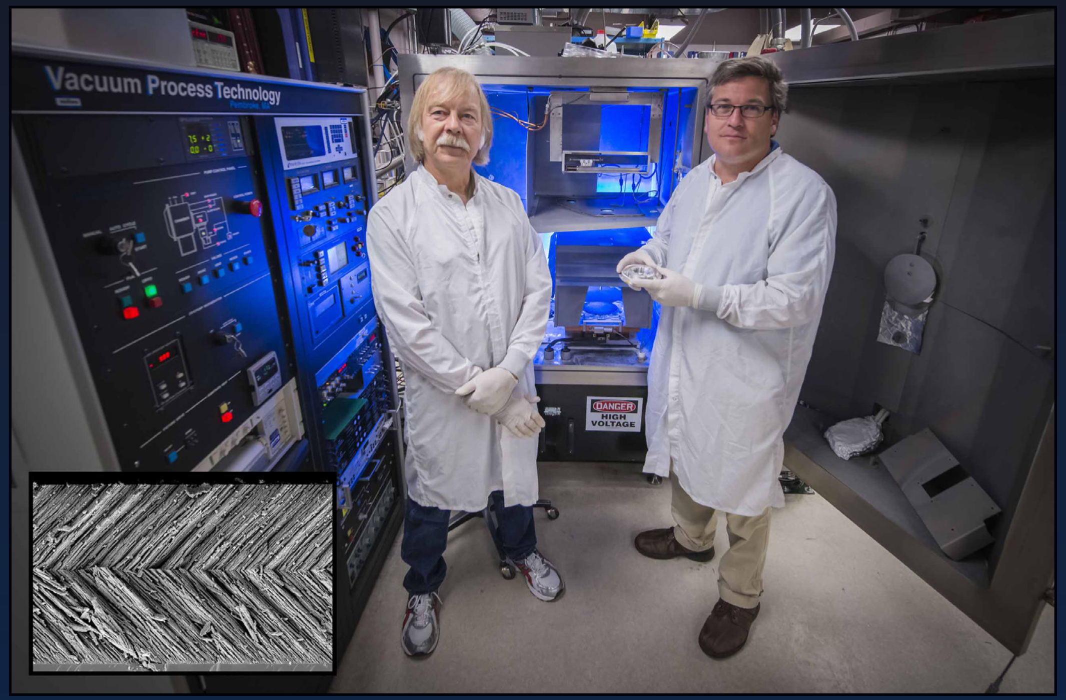
"University Professorships are awarded for exceptional contributions to society and the University," said President Joel Seligman. "I am delighted to recognize Bob's accomplishments and extraordinary service with this professorship. As director of the LLE, he has led the largest single laboratory and research program at the University of Rochester. He has worked tirelessly in Washington, D.C. as an advocate for high-energy-density physics and the Laboratory. He has recruited outstanding colleagues and has been a visionary of international prominence for his work," Seligman added.

Isotope Separation System

LLE's Isotope Separation System

The Isotope Separation System (ISS) was created to provide a flexible tritium fuel supply and ensure that the purity of that fuel supply meets LLE's baseline inertial confinement fusion program requirements. The ISS will recover tritium from existing, unusable spent DT fuel, eliminate the need to ship tritium to/from external cleanup facilities, and provide LLE with the ability to examine fusion reactions at DT ratios other than 1:1.

Glancing-Angle Deposition for Distributed Polarization Rotators



Vern Gruschow and Jim Oliver shown with a 2-in. test sample coated in the system along with the insert showing the film structure

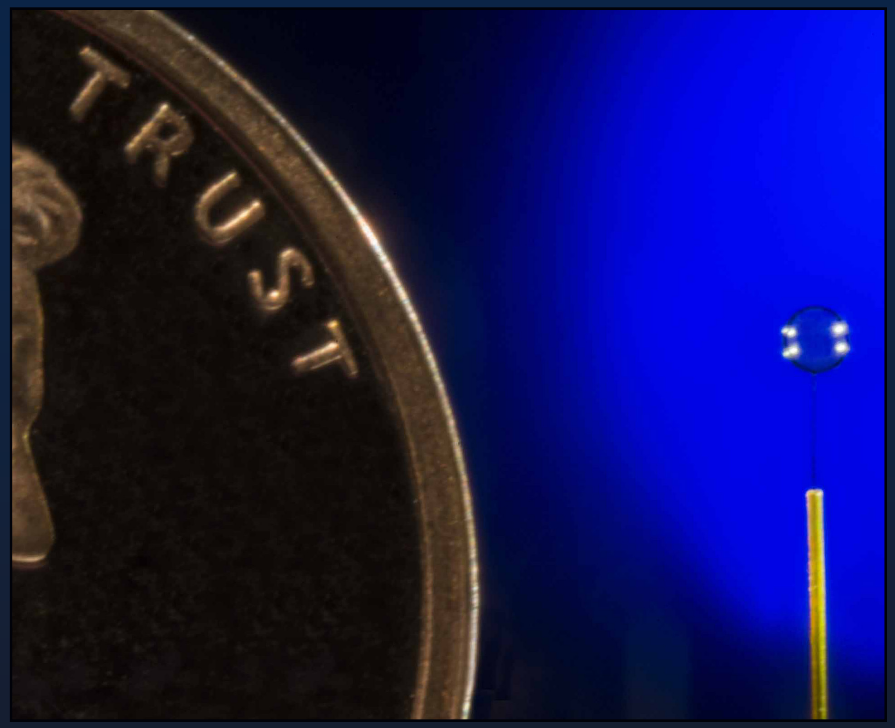
The 40-in. coating chamber in the Optical Manufacturing (OMAN) group has been configured to produce coatings by glancing-angle deposition (GLAD). These electron-beam–evaporated coatings condense on the surface of the substrate at a high angle of incidence, forming a birefringent film with an oriented columnar structure. By translating the substrate behind an aperture, the surface may be patterned with coated regions of quarter- and half-wave plates. Such a component enables spatially varying manipulation of incident polarization.

NIF Polar Drive

LLE scientist Matthias Hohenberger discussing a just-completed NIF (National Ignition Facility) polar-drive implosion

In ICF implosions, nonuniformities seeded by both laser-imprint and initial shell-mass perturbations can grow as a result of hydrodynamic instabilities, such as the Richtmyer–Meshkov (RM) and Rayleigh–Taylor (RT) instabilities. This potentially results in a severe degradation of the target compression and neutron yield, and accurate modeling and understanding of nonuniformity growth at ignition-scale conditions is key for confidence in ignition designs. As part of LLE's polar-direct-drive (PDD) campaign at the National Ignition Facility (NIF) to develop a direct-drive–ignition platform, LLE-led experiments were initiated on the NIF in 2014 to explore hydrodynamic instability growth in spherical, PDD implosion geometry.

Next-Generation Cryogenic Target



Type 1E target mount

A next-generation cryogenic target was developed that will employ a new mounting stalk that is specifically designed to be insensitive to vibrational energy once aligned to the 60 beams of the OMEGA laser. Referred to as the "Type 1E target mount," the new stalk was adapted by Mechanical Engineering's Brian Rice from an original design by David Harding and Mark Bonino and uses a 17-μm-diam silicon carbide fiber to attach the cryogenic capsule to a polyimide tube that helps damp vibrations. The alignment-stability requirement is ~1% of the capsule diameter. These targets are filled with several hundred atmospheres of deuterium–tritium fuel and cooled to 19.6 K, or –424°F. Mathematical models, based on mechanical properties measured at 19.6 K, were used to select the target assembly materials and dimensions needed to ensure the stability requirement. Once irradiated by the 60 OMEGA beams, these capsules implode and produce a fusion energy yield of ~5×10^{13} DT neutrons which is ~100 J of fusion energy.