vapor-phase etch to take away the underlying silicon, and then removed the oxide shell with a buffered hydrofluoric acid etch, which releases the silicon levers.

Once antibody-based recognition is implemented to form an "immuno chip," these ultra-sensitive nanomechanical oscillators may prove to be rapid, economical biosensors, said the researchers.

RICHARD LOUIE

Damage Threshold of Extreme-Ultraviolet Multilayer Mirrors Measured

The rapid advance of coherent extreme-ultraviolet (EUV) sources, such as free-electron lasers, requires the development of new optical materials. Among them are high-reflectivity mirrors, which are usually prepared by producing multilayer coatings of Mo/Si, W/C, W/Si, and, more recently, Sc/Si. However, damage to the mirrors when exposed to high peak powers of EUV light presents a problem because the peak power and fluence of EUV sources have recently increased significantly. For example, the radiation fluence of a capillary-discharge neon-like Ar laser operating at 46.9 nm can exceed 1 J/cm^2. In the March 15 issue of *Optics Letters*, M. Grisham of Colorado State University, Yu.P. Pershyn of the National Technical University in the Ukraine, A.V. Vinogradov of the P.N. Lebedev Physical Institute in Moscow, and their colleagues have studied the damage of Sc/Si multilayer mirrors exposed to intense EUV laser pulses.

The researchers prepared the multilayer mirrors by dc magnetron sputtering. The multilayers consisted of several periods of Sc/Si pairs, each with a thickness of 26.7 nm and a ratio of layer thickness of H (Sc)/H(Si) of 0.7. A 5-nm-thick Si protective layer capped the multilayers. Mirrors were fabricated on substrates of silicon and borosilicate glass. The irradiation was conducted by focusing the output of a tabletop capillary-discharge neon-like Ar laser emitting 1.2 ns pulses at a wavelength of 46.9 nm. Scanning and transmission electron microscopy (SEM and TEM) and small-angle x-ray diffraction (XRD) techniques were used to analyze the multilayers after irradiation. For some of the tests, the sample was moved after each laser shot, so that the site was hit by only a single pulse. In other tests, the sample was moved relative to the laser beam, so that a large area was damaged to permit small-angle XRD measurements to be performed. The results of the SEM, cross-sectional TEM, and small-angle XRD measurements show that the damage mechanism is of a thermal nature, with evidence of melting and even boiling of the material at high laser fluence. A damage threshold of 0.08 J/cm^2 was measured, comparable to the 0.7 J/cm^2 found necessary to damage a bare Si substrate. This value is similar to the thresholds found in Mo/Si, W/C, and W/Si coatings measured at much shorter wavelengths.

ROSALIA SERNA

Single ZnS Nanoribbons Lase under Optical Pumping

Nanowires have exciting applications as building blocks of nanodevices. However, they are difficult to study due to their small size. Nanoribbons are easier to study because their larger size allows easier access, manipulation, and processing. In the February 16 issue of *Applied Physics Letters*, S.T. Lee from the City University of Hong Kong, X.M. Meng from the Technical Institute of Physics and Chemistry in Beijing, and co-workers report the fabrication of ZnS nanoribbons that were then studied using transmission electron