between the area of a given droplet and the average area of its nearest neighbor indicates a narrow size distribution. Similar correlation between individual droplet radii and the corresponding distances to the nearest neighbor indicates a long-range repulsion between droplets that scales with droplet size. This repulsion may be responsible for the absence of coarsening effects. Further understanding and refining of this model could lead to better control of thin-film morphologies.

TIM PALUCKA

Method Developed for Ultraprecise Optical Frequency Measurements

Researchers from the National Institute of Standards and Technology (NIST) and Lucent Technologies/Bell Labs have produced an "ultraprecise" method for measuring the frequency of visible and infrared light. Reported in the April 28 issue of *Science*, the technique uses a single laser to measure optical frequency instead of a cumbersome and expensive multiple-laser system. The measurements made by the NIST/Lucent system have a higher level of precision than conventionally derived ones because they are directly compared to the well-defined primary frequency standard of a cesium-133 atomic clock.

The researchers "locked" an rf-clock-stabilized titanium-sapphire laser in a manner that generated a repetitive train of ultrashort optical pulses, referred to as a "repetition frequency." Each pulse contains only about 3 cycles of light. The output spectrum of such a laser is a series of sharply defined spectral lines separated by the repetition frequency. The scientists call this spectrum a "comb" because it has the appearance of a common pocket comb.

Ordinarily, there would be no fixed relationship between the envelopes of the pulses and the waves of the laser light, but in this work, the envelope and the waves are locked together with a controlled phase relationship. In addition, the repetition rate of the pulses is locked to the standard cesium microwave frequency (9.2 GHz). This makes it possible to determine the absolute frequency of each of the "teeth" of the comb and provides a means of measuring optical frequencies with a single laser.

A visible continuum of light-wave frequencies is generated within a novel fiber with an air/silica microstructure. Light is very tightly confined to the glass fiber's solid core by a ring of air holes surrounding the core. This unusual fiber creates an extremely small effective area, possesses characteristics for light dispersion, and keeps light loss to a minimum. This allows for the generation of a frequency continuum with only 1/1000 of the power previously needed.

A similar effort by the NIST/Lucent team in conjunction with a team from the Max-Planck-Institut für Quantenoptik is reported in the May 29 issue of *Physical Review Letters*, and the Max Planck group also has an article on this technique scheduled to be published in the July 15 issue of *Optics Letters*. □

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