Silicon Shinethrough Barriers: It has long been known that laser light may penetrate into a transparent target before a critical plasma density layer forms on the surface.[1] This light may cause internal damage via laser filamentation that can potentially seed hydrodynamic instabilities in imploding targets. Aluminum coatings have been routinely used in the past on OMEGA warm capsules to mitigate this problem; however, Al is undesirable as a barrier coating for cryogenic direct-drive capsules as it renders the capsules optically opaque and impossible to permeation fill with D_2 or DT. In addition, optical transparency is required for optical characterization of cryogenic capsules and to provide IR radiation for the layering of D_2-filled capsules. Past LLE experiments have identified silicon as a potential barrier material for cryogenic targets.[2] Preliminary studies indicate that Si-coated CH shells can be permeation filled with D_2, cooled, IR layered, and characterized using shadowgraphy.

A recent OMEGA planar-target experiment confirmed the effectiveness of Si shinethrough barriers. One face of a glass cube was coated with different thicknesses of Si [Fig. 1(a)], while the opposite side was coated with 1000 Å of Al. A single low-energy (~1.5-J) OMEGA beam irradiated the Si-coated side at ~35 J/cm^2 in 200 ps. In the unprotected regions, the "shinethrough" before plasma formation left self-focusing tracks in the target as shown in Fig. 1(b). Closer examination indicates that possibly even 250 Å of Si is sufficient to suppress shinethrough into the target. The VISAR diagnostic was used to observe the Al backing at the transition region between no Si coating and 750-Å Si coating [Fig. 1(c)]. The VISAR record suggests that a 750-Å Si coating completely protects the Al backing from shinethrough. More studies are planned to optimize the Si layer design.

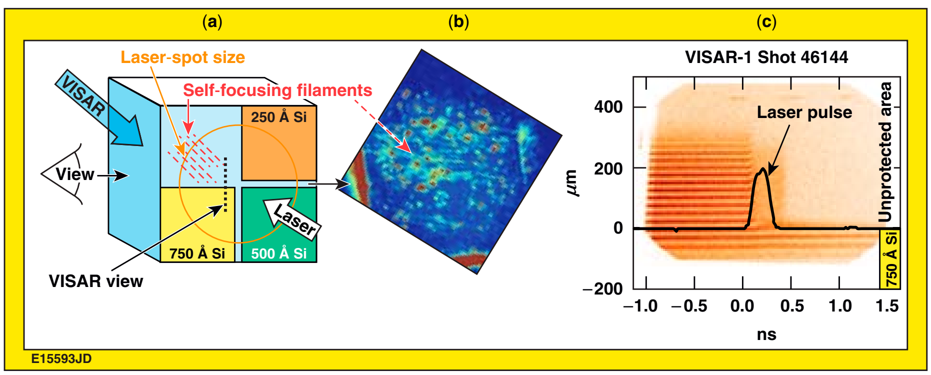

Figure 1. (a) Shinethrough target with different Si coatings. (b) Side-on view of the irradiated target shows filamentation tracks in the unprotected areas. (The few filamentation channels observed in the lower part of the beam path are due to the uncoated gap between the 750-Å and 500-Å coatings.) (c) VISAR shows no motion of the Al backing behind 750-Å Si, while a prompt expansion of the Al is seen in the unprotected region.

Intel Science Talent Search: Three of the thirteen high school students participating in LLE's 2006 Summer High School Research Program were name semi-finalists in the prestigious Intel Science Talent Search competition: Alexandra Cok (Allendale Columbia), Zuzana Culakova (Brighton), and Rui Wang (Fairport). Rui Wang was just selected as one of the forty finalists in the national competition. The final judging will take place in Washington, D.C., in March.

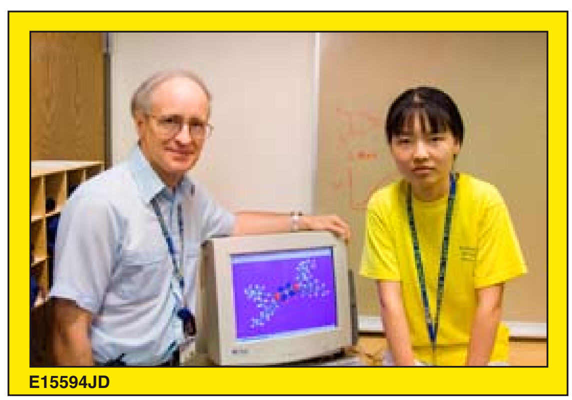

Figure 2. Rui Wang with her advisor, Ken Marshall. Rui's project was entitled, "Nickel Dithiolene Systems: Computation Modeling of Spectral Properties."

OMEGA Operations Summary: A total of 120 target shots were performed on OMEGA during January with an overall shot effectiveness of 97.1%. The NIC accounted for 86 of these shots: LLE (33) and LLNL (53). A total of 34 non-NIC program shots were taken for LANL.

1. J. E. Balmer *et al.*, Opt. Commun. **24**, 109 (1978).
2. Y. Fisher *et al.*, Bull. Am. Phys. Soc. **43**, 1784 (1998).

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