Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Microdroplet target synthesis for kilohertz ultrafast lasers[1]
PAVEL CHVYKOV, WISE ONGG, JAMES EASTER, BIXUE HOU, JOHN NEES, KARL KRUSHELNICK, University of Michigan, Ann Arbor — The difficulty of finding suitable solid targets for high rep-rate (up to kHz) lasers has been one of the major setbacks for the applicability of solid-target laser interaction experiments. In this work, we have developed a method for producing spatially stable micron-scale liquid targets of flexible shapes at kHz repetition rate for use in air and vacuum, by perturbing 5 and 30-μm diameter streams with fs laser pulses and monitoring the temporal development of the perturbation. Using water, we have produced features such as 2.1-μm diameter droplet and 1.3-μm diameter neck with less than $\pm$0.3-μm shot-to-shot variation, with prospects for further reduction in size and variability. The use of such micron-scale targets can be expected to prevent conductive heat dissipation, thus increasing the interaction temperature by more than two orders, enhance field strength for ion acceleration and allow spatially-deterministic laser-cluster experiments.

[1]Center for Ultrafast Optical Science, College of Engineering, University of Michigan, Ann Arbor, MI 48105 USA

Pavel Chvykov
University of Michigan, Ann Arbor

Date submitted: 25 Aug 2010 Electronic form version 1.4