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Plasma generation in mass-limited water targets JUNGMOO HAH, KIRK LIBERTY, JOHN NEES, KARL KRUSHELNICK, ALEXANDER THOMAS, Univ of Michigan - Ann Arbor — One major problem associated with high repetition-rate experiment is obtaining a suitable new target for each shot, while maintaining shot-to-shot spatial stability. For high repetition-rate laser experiments with solid targets, rotating stage is usually used for moving a target point, which causes stability and size problems. To solve these problems, some researchers have tried to replace solid targets with liquid stream or droplet. Here, we use a syringe pump, a piezoelectric device and a tungsten needle to make continuous and stable water droplets with a diameter of ~ 2 μm. These mass-limited water droplets as a target have some advantages. First, heat dissipation is blocked, so the target is entirely heated. Second, effective spatial contrast is improved by reducing the interaction between lower intensity spatial wings of the beam and a single-micron target. Third, at the relativistic laser intensities, a smaller target allows for higher electron densities at the target's back surface, which enhances field's strength for ion acceleration. For these advantages, it is required that we understand plasma generation processes. Therefore, we investigate the processes by irradiating fs laser pulses to mass-limited droplets and these interactions are captured by CCD.

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