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Explosive fragmentation ALEXANDRE VLEDOUTS, Aix Marseille Université, IRPHE, Marseille, France, JOSÉ GRAÑA-OTERO, School of Aeronautics, Universidad Politécnica de Madrid, Spain, JOEL QUINARD, NICOLAS VANDENBERGHE, EMMANUEL VILLERMAUX, Aix Marseille Université, IRPHE, Marseille, France — We report on an experiment consisting in forcing the fast radial expansion of a spherical liquid shell. The shell is formed by the capillary pinch off of a water thin annular jet surrounding a jet of reactive gaseous mixture at ambient pressure. The encapsulated gas in the resulting water bubble is a mixture of Hydrogen and Oxygen in controlled relative proportions, which is ignited by a laser plasma aimed at the center of the bubble. The strongly exothermic combustion of the mixture induces the expansion of the hot burnt gas, pushing the shell radially outwards in a violently accelerated motion. That motion triggers the instability of the shell, developing thickness modulations ultimately piercing it in a number of holes. The capillary retraction of the holes concentrates the liquid constitutive of the shell into a web of ligaments, whose breakup leads to stable drops. We document the overall process, from the kinematics of the shell initial expansion, to the final drops size distribution as a function of the composition of the gas mixture and bubble shell thickness.

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