

Portfolio Paper

Artificial Bubble Nucleation in Engraved Champagne Glasses

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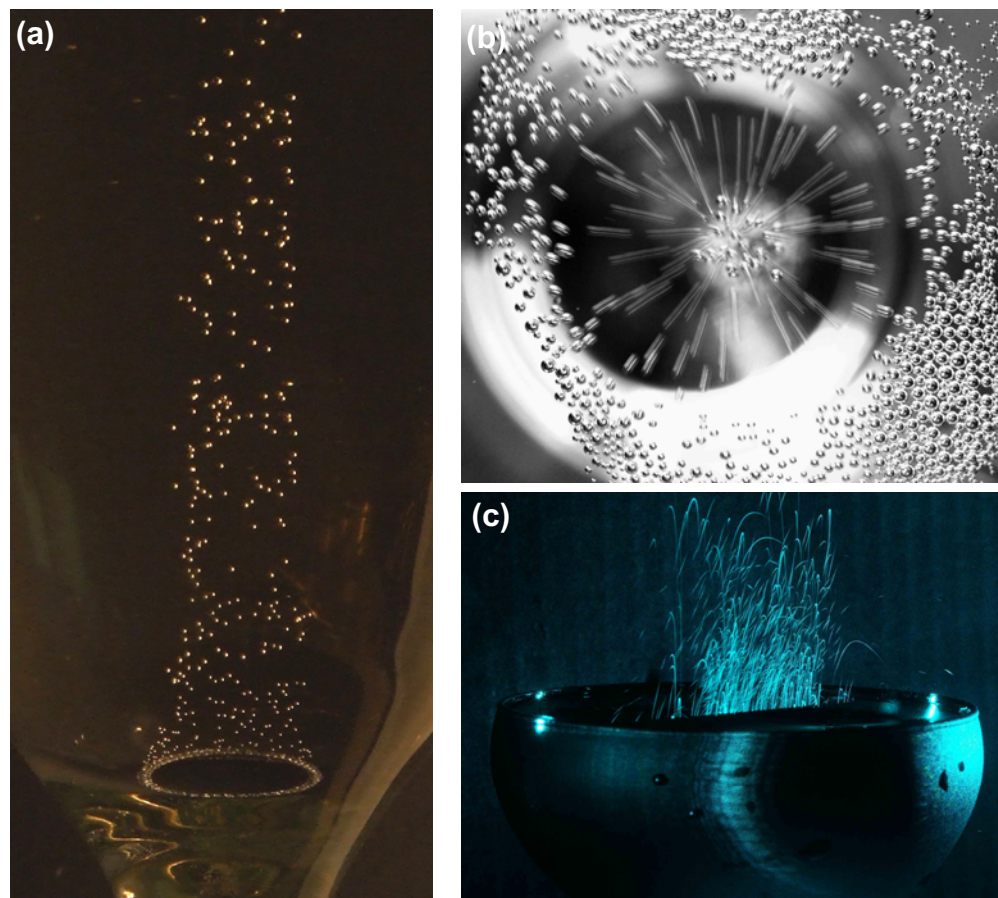


Fig. 1. Artificial bubble nucleation in engraved glasses: bubble column (a), top view of the bubble surface flow (b), droplet fog (c).

In order to ensure an aesthetic and controlled bubbling behaviour during champagne tasting, specialized glassmakers use to engrave the bottom of glasses by means of impact laser techniques. This industrial process creates artificial nucleation sites which are much more vigorous in terms of bubbling behaviour compared to the natural and random effervescence from tiny particles stuck on the glass wall⁽¹⁾. The resulting bubble column (Fig. 1(a)) is the cause of both the generation of large vortical coherent structures in the liquid flow⁽²⁾ and the presence of a bubble surface flow acting like a planar isotropic source point (Fig. 1(b)). Due to their short lifetime, most bubbles burst at the free surface during their isotropic migration. A laser sheet in the symmetry plane of the glass highlights the projection in the central migration area of hundreds of champagne droplets induced by bursting events. By use of a long enough exposure time of a digital photo camera, one gets the feeling of visualizing a splendid droplet fog in motion above the champagne surface (Fig. 1(c)).

References : (1) Liger-Belair, G. et al., J. Agric. Food Chem., 55 (2007), 882-888. (2) Polidori, G. et al., Journal of Visualization, 11-3 (2008), 184.