D 1.7/ Summary of the deliverable: "Facility for temperature/species measurements of collapsing bubbles"

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Cavitation has been a longstanding problem in various industrial applications, such as hydropower generation and marine propulsion. It is always associated with negative consequences, namely erosion, noise and alteration of hydrodynamic performances. Recently, there is increasing interest in the use of cavitation bubbles in biomedicine and benefit from their remarkable ability to concentrate energy to perform powerful and localized in vivo tasks. Yet the underlying physics is not fully understood.

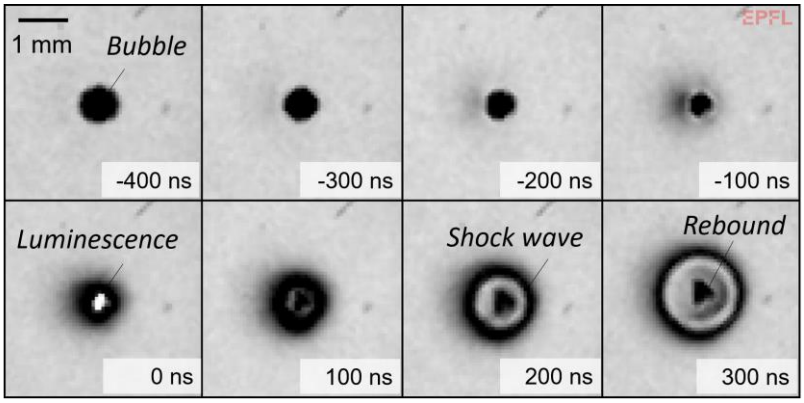

Figure 1: last stage of spherical bubble collapse. Adapted from [1]

The actual project aims at investigating the role of thermochemistry in cavitation by direct control of a number of thermochemical parameters. We sat up state of the art experiments, involving laser-induced bubbles, ultrasound-induced cavitation and high-speed cavitating jet. In all these configurations, it is possible to control key parameters, such as pressure, temperature, nature and amount of dissolved gas. Our preliminary results reveal the ability of cavitation bubbles to generate oxygen through dissociation of water molecules. We could also confirm the major influence of the nature of dissolved gas and water temperature on cavitation erosion. We will use an electrochemical approach to explain these findings.

References

[1] O. Supponen, *Collapse phenomena of deformed cavitation bubbles*, École Polytechnique Fédérale de Lausanne, N 8089, 2017