Congratulations !

~ Young Sonochemist Award in 20th JSS Meeting & IWAS2011 ~

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Title: Sonoluminescence and sonochemiluminescence in microreactors

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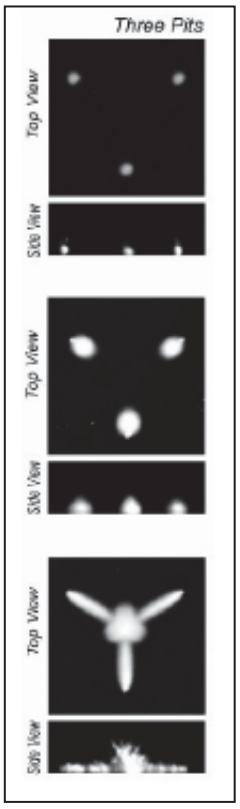
[Research outline]



The miniaturization of several chemical reactors is one of the most promising trends in current science. The applications that could benefit from the correct understanding of microbubbles cavitation cover several activities, from high temperature and pressure reactions, to the destruction of cancerous cells, to the ultrasound applications for lithotripsy, or diagnose techniques of unborn fetus. Purification of water, special food, chemical compounds and reactions that require complex and dangerous conditions (temperature and pressure) can be carried out in microfluidic chips with a considerable saving in reactants, increased efficiency and safer operation conditions leading to a “green technology” alternative to existing techniques. Our main objective is the design and fabrication of efficient microreactors for carrying out specific chemical reactions [1].

The figure to the right is adapted from [1], showing interesting trajectories of ejected microbubbles from three pits at different power levels.

We measured light emission from an ultrasonic microreactor at different power levels in the presence and absence of pits on surfaces that promote nucleation of microbubble streamers. SL and SCL voltage signals from the studied systems show a clear difference between the reactors without pits and pits. SL and SCL averaged intensities also show trends, which evidence the difference in light emitting and chemically active bubble population.

[1] Fernández Rivas, D., A. Prosperetti, A.G. Zijlstra, D. Lohse, J. G. E. Gardeniers E□cient Sonochemistry through Microbubbles Generated with Micromachined Surfaces, Angew. Chem. Int. Ed., 49: 9699 - 9701. doi: 10.1002/anie.201005533, (2010).

[Acknowledgements]

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