

**A BUBBLE DYNAMICS MODEL INCLUDING HEAT AND MASS DIFFUSION AND
CHEMICAL REACTION: WHAT DO WE LEARN FROM SONOLUMINESCING BUBBLES
FOR ULTRASOUND DIAGNOSTIC BUBBLES?**

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Phase diagrams for single bubble sonoluminescence (SBSL, [1]) are calculated. The employed model is based on a set of ordinary differential equations and accounts for the bubble hydrodynamics, heat exchange, phase change of water vapor, chemical reactions of the various gaseous species in the bubble, and diffusion/dissolution of the reaction products in the liquid [2,3]. The results of the model are compared in detail to various phase diagram data from recent experimental work [4,5], among which are air-water systems as well as systems with a xenon-nitrogen mixture as the saturated gas. Excellent quantitative agreement is found for all considered cases. Moreover, we find that the onset of SBSL is hysteretic. When starting with air typical temperatures before onset are 5500K and 15000K thereafter.

We also explore the possibility to apply this model to bubbles under ultrasound diagnostic conditions.

References:

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