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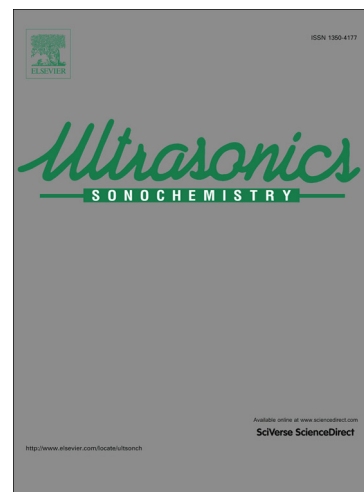
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Water-molecular emission from cavitation bubbles affected by electric fields

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Abstract

Orange emission was observed during multibubble sonoluminescence at 1 MHz in water saturated with noble gas. The emission arose in the vicinity of the peeled ground electrode of a piezoceramic transducer exposed to water, suggesting that cavitation bubbles were affected by the electric fields that leaked from the transducer. The spectrum of the emission exhibited a broad component whose intensity increased towards the near-infrared region with peaks at 713 and 813 nm. The spectral shape was independent of the saturation gas of He, Ne, or Kr. The broad component was attributed to the superposition of lines due to vibration-rotation transitions of water molecules, each of which was broadened by the high pressure and electric fields at bubble collapse. An emission mechanism based on charge induction by electric fields and the charged droplet model is proposed.

Key words: multibubble sonoluminescence; electric fields; water molecular emission;
droplet model

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