Abstract Submitted
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Cavitation conversion efficiency for plasma generation methods in water[1] XIN TANG, DYLAN BALDWIN, Texas AM University, JACK ERSPAMER, Tarleton State University, KUNPENG WANG, CHRISTOPHER CAMPBELL, DAVID STAACK, Texas AM University — Cavitation compression is an effective energy focusing process for plasma generation in liquids. The collapsing process of cavitation is so intense that gases inside the cavitation will enter high energy states with plasma generation accompanied by light and shock wave emission. Three different underwater plasma generation methods are demonstrated based on the effective cavitation conversion efficiency. Sonoluminescence converts diffuse acoustic energy into cavitation bubble. Electrically-induced (corona or spark gap setup) cavitation initiates as a luminescent singularity then expands and oscillates as a cavitation bubble. Unlike other two, the mechanically-induced cavitation, usually non-spherical, can be created by impulsive hydrodynamic flow. Volumetric effective radius is utilized to estimate the maximum cavitation potential energy and the cavitation conversion efficiency is evaluated as the ratio of the maximum cavitation potential energy (before first singularity of the collapsing cavitation) over the input energy. The results indicated that the mechanically-induced cavitation for plasma generation is the most efficient method and it will make high efficient processing systems feasible for a broad range of chemical and physical engineering applications.

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