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# Energy Reclamation in Micro Cavitating Flow

**Authors :** Morteza Ghorbani, Reza Ghorbani

**Abstract :** Cavitation phenomenon has attracted much attention in the mechanical and biomedical technologies. Despite the simplicity and mostly low cost of the devices generating cavitation bubbles, the physics behind the generation and collapse of these bubbles particularly in micro/nano scale has still not well understood. In the chemical industry, micro/nano bubble generation is expected to be applicable to the development of porous materials such as microcellular plastic foams. Moreover, it was demonstrated that the presence of micro/nano bubbles on a surface reduced the adsorption of proteins. Thus, the micro/nano bubbles could act as antifouling agents. Micro and nano bubbles were also employed in water purification, froth floatation, even in sonofusion, which was not completely validated. Small bubbles could also be generated using micro scale hydrodynamic cavitation. In this study, compared to the studies available in the literature, we are proposing a novel approach in micro scale utilizing the energy produced during the interaction of the spray affected by the hydrodynamic cavitating flow and a thin aluminum plate. With a decrease in the size, cavitation effects become significant. It is clearly shown that with the aid of hydrodynamic cavitation generated inside the micro/mini-channels in addition to the optimization of the distance between the tip of the microchannel configuration and the solid surface, surface temperatures can be increased up to 50C under the conditions of this study. The temperature rise on the surfaces near the collapsing small bubbles was exploited for energy harvesting in small scale, in such a way that miniature, cost-effective, and environmentally friendly energy-harvesting devices can be developed. Such devices will not require any external power and moving parts in contrast to common energy-harvesting devices, such as those involving piezoelectric materials and micro engine. Energy harvesting from thermal energy has been widely exploited to achieve energy savings and clean technologies. We are proposing a cost effective and environmentally friendly solution for the growing individual energy needs thanks to the energy application of cavitating flows. The necessary power for consumer devices, such as cell phones and laptops, can be provided using this approach. Thus, this approach has the potential for solving personal energy needs in an inexpensive and environmentally friendly manner and can trigger a shift of paradigm in energy harvesting.

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