

## Design and Fabrication of Micro-Bubble Oxygenator

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**Abstract :** This paper applies the MEMS technology to design and fabricate a micro-bubble generator by a piezoelectric actuator. Coupled with a nickel nozzle plate, an annular piezoelectric ceramic was utilized as the primary structure of the generator. In operations, the piezoelectric element deforms transversely under an electric field applied across the thickness of the generator. The surface of the nozzle plate can expand or contract because of the induction of radial strain, resulting in the whole structure to bend, and successively transport oxygen micro-bubbles into the blood flow for enhancing the oxygen content in blood. In the tests, a high magnification microscope and a high speed CCD camera were employed to photograph the time evolution of meniscus shape of gaseous bubbles dispensed from the micro-bubble generator for flow visualization. This investigation thus explored the bubble formation process including the influences of inlet gas pressure along with driving voltage and resonance frequency on the formed bubble extent.

**Keywords :** micro-bubble, oxygenator, nozzle, piezoelectric

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