# Ultrasound Contrast Agents: from Buckling Dynamics to Swimming

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Cleverly engineered microswimmers have been of increasing scientific interest, as they show great promise in various biomedical applications. In this study, we propose a novel mechanism of propulsion in fluids at the microscale, using a buckling mechanism activated by pressure waves. We considered an in vivo-friendly hollow elastic shell of micrometric size composed of a lipidic membrane enclosing a gas bubble. Such microshells are approved for clinical use as diagnostic ultrasound contrast agents (UCAs). We experimentally investigate the buckling dynamics of microshells upon an increase of external pressure. The effect of the driving frequency is studied as well as that of the size and mechanical properties of the microshells. We evidence, a non-zero displacement upon a complete cycle of deflation and re-inflation of the microshells, which includes buckling events. The proposed propulsion mechanism whose direction is controlled in the shell reference frame can be an answer to the problem of directivity accounted in the acoustic radiation force technique used in ultrasound molecular imaging and drug delivery.