Nanoscale cluster structure of O2 gas-filled nanobubbles in O2 gas-supersaturated alkaline solution

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Abstract

There exists a close parallelism between gas-filled nanobubble solutions and ultra-high dilutions. Both these solutions contain Brownian nano-sized bubbles. We have studied aggregation kinetics of O2 gas-filled Brownian nanobubbles and their nanoscale cluster structure in 0.1M NaCO3 with NanoSight Particle Tracking Ananlysis (NTA) and transmission electron microscopy (TEM). A number of discrete peaks in a NTA size distribution of O2 nanobubbles in 0.1M NaCO3 eight days later after production are closely related to the existence of stable nanobubble clusters composed of 6-9nm nanobubbles that are inferred from the internal void size observed with TEM. Recent reports on 1HNMR of nanobubble water and its biological effects of wheat germination by Ohshita's group may correlate with Demangeat’s NMR studies and germination experiments performed by many groups since the first publication by Lily Kolisco in 1923. Demangeat’s has recently published a review on the essential role of succussion that can cause nanobubble formation.1

References


Keywords: Di-oxygen gas filled nanobubble, nanoscale cluster structure, aggregation kinetics, high dilution

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