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Title

Concentration determination of oxygen nanobubbles in electrolyzed water

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Abstract

Water electrolysis is well-known to produce solutions supersaturated with oxygen. The oxygen in electrolyzed solutions was analyzed with a dissolved oxygen meter and the Winkler method of chemical analysis. The concentration of oxygen measured with the dissolved oxygen meter agreed with that obtained using the Winkler method. However, measurements using a 10-fold dilution method showed the larger concentration of dissolved oxygen compared as the above methods. We developed a modified Winkler method to measure total oxygen concentration more accurately, which agreed with the results obtained from the 10-fold dilution experiment. The difference in measurements is due to the existence of oxygen nanobubbles, as confirmed by the observation of dynamic light scattering using a laser. Further analysis of the oxygen nanobubbles demonstrated that the stability of the nanobubbles was sufficient for chemical reaction and solvation to bulk solution.