Effect of Electrode Potential on the Drag Force on Gold and Polyvinyl Butyral Surfaces in a Flowing Aqueous Fluoride Solution

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It is shown that positive electrical polarization reduces the drag force on gold- and polyvinyl butyral (PVB)-coated spheres immersed in a stream of aqueous sodium fluoride solution. This effect is related to a decrease in the interfacial viscosity of the solution at the positively polarized gold and PVB surfaces, as obtained from quartz resonator measurements. The decrease in viscosity at a polymer-coated electrode is larger than that at a gold electrode, which is consistent with drag force measurements. The drag force reduction due to decreased interfacial viscosity at a polymer-coated metallic surface on application of an electrical potential widens the range of possible applications of this effect for active manipulation of wall-bounded liquid flows, given that the use of metal surfaces is limited by their risk of corrosion.

Keywords: Drag force, Gold surface, Polyvinyl butyral surface, Interfacial viscosity, Quartz resonator

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