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TITLE: Influence of glass composition on the kinetics of glass etching and frosting in concentrated HF solutions
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 ABSTRACT BODY:
Abstract Body: During etching of a multicomponent glass in concentrated hydrofluoric acid (HF) solutions, a crust can gradually appear on the glass surface, resulting from the precipitation of anions released by the glass dissolution, with cations coming from the etching solution or from the glass. To understand the impact of this crust on the overall kinetics of both etching and frosting process, we have studied the dissolution of four types of commercial glass substrates in etching solutions containing various concentrations of HF, by two independent methods: the chemical analysis by ICP-OES of the amount of Si dissolved from the glass as a function of time, and the measurement of the glass weight loss with time. These two methods showed that the glass etching rate decreases with time as a result of crust formation which gradually becomes more protective. Then, increasing the amount of HF in the etching solution increased the etching rate in a non-linear way, and the etching rate increased with the alumina content of the glass. A chemical analysis of the amount of Si present in the crust also revealed that the amount of HF in the etching solution has an impact on the amount of crust deposited on the glass surface. Finally, all these kinetic data were rationalized based on a semi-empirical quantitative model, allowing to extract characteristic dissolution and precipitation constants.
KEYWORDS: Glass etching, Kinetics, Multicomponent glass, Glass frosting.
Presenter Acknowledgment (Invited): I have read and acknowledge the above paragraph
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