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# CANCELED - Effect of Humidity and Included OH and During Indentation of Silica Glass

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## Abstract

It has been shown that the presence of water can dramatically impact the fracture and hardness of silicate glasses during indentation. Despite how dramatic this effect is, it is often overlooked due to the difficulty in conducting well-controlled experiments. It is argued that water permeates the indented regions, disrupting the network with non-bridging OH groups. However, it is not known how this can occur on the timescale of a typical indentation. To study these effects, we performed a series of indentations on a set of SiO<sub>2</sub> glasses prepared with OH contents from 10 to 1000 ppm. Each glass was both indented in a humidity controlled glovebox at a range of humidities and indented directly through water droplets. Additionally, to probe the kinetics of water's interaction with the sub-indenter region, we varied the loading rates of the indentations across several orders of magnitude. The implications for hardness testing of glass will be discussed.

**Keywords:** Nanoindentation, Humidity, Water Content, Strain Rate

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