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Effects of Chemical Etching with Sulfuric Acid on Glass Surface

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Glass slides were chemically etched with sulfuric acid using five different methods. We investigated the effects of the chemical etching conditions on such properties as chemical composition, surface roughness, and the thermal stability of the glass. Sodium and carbon atoms in the surface of the glass are effectively eliminated by chemical etching with sulfuric acid. The glass slides were boiled for 30 min in 95% sulfuric acid and were depth profiled at room temperature with X-ray photoelectron spectroscopy (XPS), the Na 1s signal was not detected in the detection limit of XPS. Surface morphology of the glass was very different depending on the concentration of sulfuric acid. The surface of the glass etched with 50% sulfuric acid was rougher than that of glass etched with 95% sulfuric acid. The sodium concentration of the glass boiled for 30 min in 95% sulfuric acid was nearly zero at the glass surface, and the sodium composition changed very little with annealing temperatures up to 350°C in a vacuum environment. However the sulfur concentration at the glass surface due to the sulfuric acid increased with increasing temperature.