

SURFACE TREATMENT OF SiO₂ WITH VARIOUS CHLOROFLUOROMETHANES AND CF₄

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For the surface modifications, fluorinations of silica samples, including a quartz fiber and a commercial glass fiber, were carried out at around 500°C in a conventional flow reactor. The surface compositions before and after the fluorination were determined by XPS analysis. Among chlorofluoromethanes and CF₄, CCl₃F was most effective for the fluorination. Surface OH groups were completely removed or replaced by the fluorination. Furthermore, the XPS analysis after Ar⁺ etching showed that the fluorination proceeded deeply beneath the surface. Adsorptions of water vapor, hexane, hexafluoropropene, and octafluorocyclobutane showed that the silica surface became more hydro- and lipo-phobic after the fluorination. On the contrary, the chlorofluoromethane-treated surface exhibited a higher affinity to the perfluorocarbons compared to the untreated surface.