The chemical modification of SiO$_2$ surfaces is important in diverse applications including the design of new chemical sensors, composite materials, heterogeneous catalysts/immobilized enzymes, and chromatographic stationary phases. It is desirable to prepare these materials under conditions to precisely control surface structure, to rationally design surface modified silicas with improved properties. When first entering this field we were pleased to accomplish silica surface silylation reactions with some knowledge and control over structure. As more was learned we began taking into account different types of reactive functionalities which can lead to a mixture of surface structures. Studies were then aimed to reduce the number of different types of reactive surface groups which exist on silica, and study how that approach can be used to synthesize materials of known and variable structures. Finally, a more complete model of silica surface chemistry which includes all known functional groups has been applied to study the kinetics of a surface modification reaction. The results explain a long known and puzzling phenomenon of these surface modification reactions.

References:

