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Diffusion of biomolecules in nanoporous glasses GREGORY ZIMMERLI, NASA Glenn Research Center, MARIUS ASIPAUSKAS, National Center For Space Exploration Research, KATRINA SCHWEIKER, Penn State College of Medicine, NICOLE COMPITELLO, National Center For Space Exploration Research, DAVID FISCHER, NASA Glenn Research Center — Two-Photon Fluorescence Correlation Spectroscopy (FCS) was used to measure the diffusion of simple and biomolecular fluorophores in nanoporous glasses, a candidate biosensor substrate. Diffusion of two fluorescent molecules of similar size, cationic rhodamine 6G in methanol and anionic fluorescein in sodium borate buffer, was measured in partially silanized porous Vycor 7930 glass (4 nm average pore size). The diffusion time constant in Vycor is measured to be 12.5 times slower than in bulk samples, for both fluorophores. Our data is consistent with a tortuosity factor correction for the diffusion of these molecules in Vycor glass. We also investigated diffusion of FITC labeled multiclonal E.coli antibodies in 50 nm and 100 nm Controlled Porosity Glass (CPG) samples. Both treated and untreated CPG samples were investigated, using an ELISA-based protocol for the treated sample. We find that the diffusion timescales depend on the pore size, and the functional form of correlation function deviates from the three dimensional diffusion model.

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