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A Microfluidics Platform for Visualizing Single Molecule Dynamics in a Model Glycocalyx DYLAN YOUNG, ISABEL NEWSOME, JAN SCRIMGEOUR, Clarkson Univ — The glycocalyx of endothelial cells is a hyaluronan-rich polymer brush that extends from the endothelial surface into the blood vessel where it is involved in mechano-sensing, shear flow moderation and molecular filtering. The brush is formed by long hyaluronan molecules that is extruded through the cell membrane and the structure of the brush is manipulated by a diverse set of hyaluronan binding proteins. However, the low molecular density, high levels of hydration and complex flow environment about this structure has made it a difficult target for biophysical characterization. In this poster, we present a microfluidics platform that uses a linear voice coil actuator to modulate the flow through the system. This system is applied to study a model glycocalyx that is grafted to a hydrogel force sensor. This model system allows us to probe the dynamics of proteins in the model system using high-speed single molecule microscopy, while also enabling the strain on the hydrogel substrate to be measured as the composition of the brush is manipulated.

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