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Mechanisms of selective transport through nuclear pore complex mimics LAURA MAGUIRE, MICHAEL STEFFERSON, KATHERINE RAINEY, NATHAN CROSSETTE, ERIC VERBEKE, MEREDITH BETTERTON, LOREN HOUGH, University of Colorado Boulder — Few cellular processes require such intricate active control as transport through the nuclear envelope. The nuclear pore complex (NPC) facilitates all transport, preventing most macromolecules from crossing the envelope while allowing the passage of transport factors (TFs) and their cargo. While the basic biochemical interactions of transport are well-understood, the detailed mechanism remains a topic of significant debate. We create tunable mimics of the NPC using PEG hydrogels filled with FG nucleoporins (FG nups), the intrinsically disordered proteins that line the NPC channel in vivo. We also model transport using reaction-diffusion equations. The results suggest that (1) the flexible nature of the disordered FG nups and (2) the transient, multivalent nature of FG nup – TF interactions are together sufficient for selectivity. Our model makes selectivity predictions that will be directly testable in our experimental setup. We aim to use the model to tune the mimic's parameters to maximize selectivity.

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