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Mechanisms of selective transport through nuclear pore complex mimics LAURA MAGUIRE, MICHAEL STEFFERSON, NATHAN CROSSETTE, Department of Physics, University of Colorado Boulder, ERIC VERBEKE, Department of Chemical and Biological Engineering, University of Colorado Boulder, JEESEONG HWANG, National Institute of Standards and Technology, MEREDITH BETTERTON, Department of Physics, University of Colorado Boulder, LOREN HOUGH, Department of Physics and Biofrontiers Institute, 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, the intrinsically disordered proteins that line the NPC channel in vivo. Using fluorescence microscopy and single-molecule fluorescence spectroscopy, we measure TF diffusion through the NPC mimics. Modeling based on our results suggests two possible mechanisms of TF diffusion through the nuclear pore. We aim to distinguish between these possible mechanisms and to tune the mimic's parameters to maximize the rate of passage of TFs while inhibiting the passage of other inert molecules.

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