Electronic Supplementary Material (ESI) for Soft Matter.

Synthetic Hydrogel Mimics of the Nuclear Pore Complex Display Selectivity Dependent on FG-Repeat Concentration and Electrostatics

Supporting Information

Alicia K. Friedman and Lane A. Baker*

Department of Chemistry

Indiana University

800 E. Kirkwood Avenue

Bloomington, Indiana 47405

*Author to whom correspondence should be addressed.

E-mail: lanbaker@indiana.edu;

Phone: (812) 856-1873;

Fax: (812) 856-8300

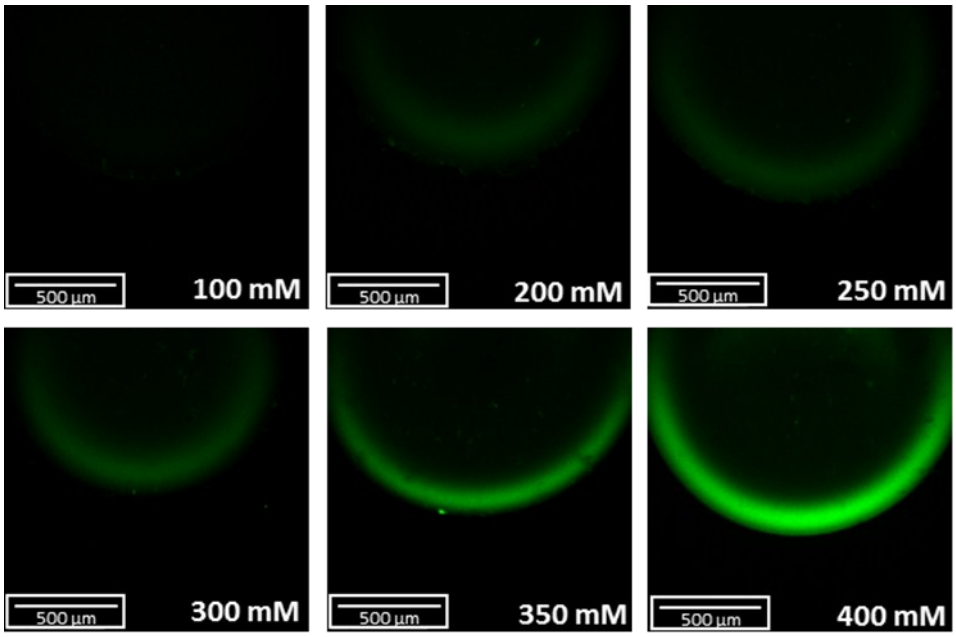

Figure S1. Representative fluorescence micrographs of GFP-Impβ entry into NPC hydrogel mimics with different concentrations of aFSFG peptide.

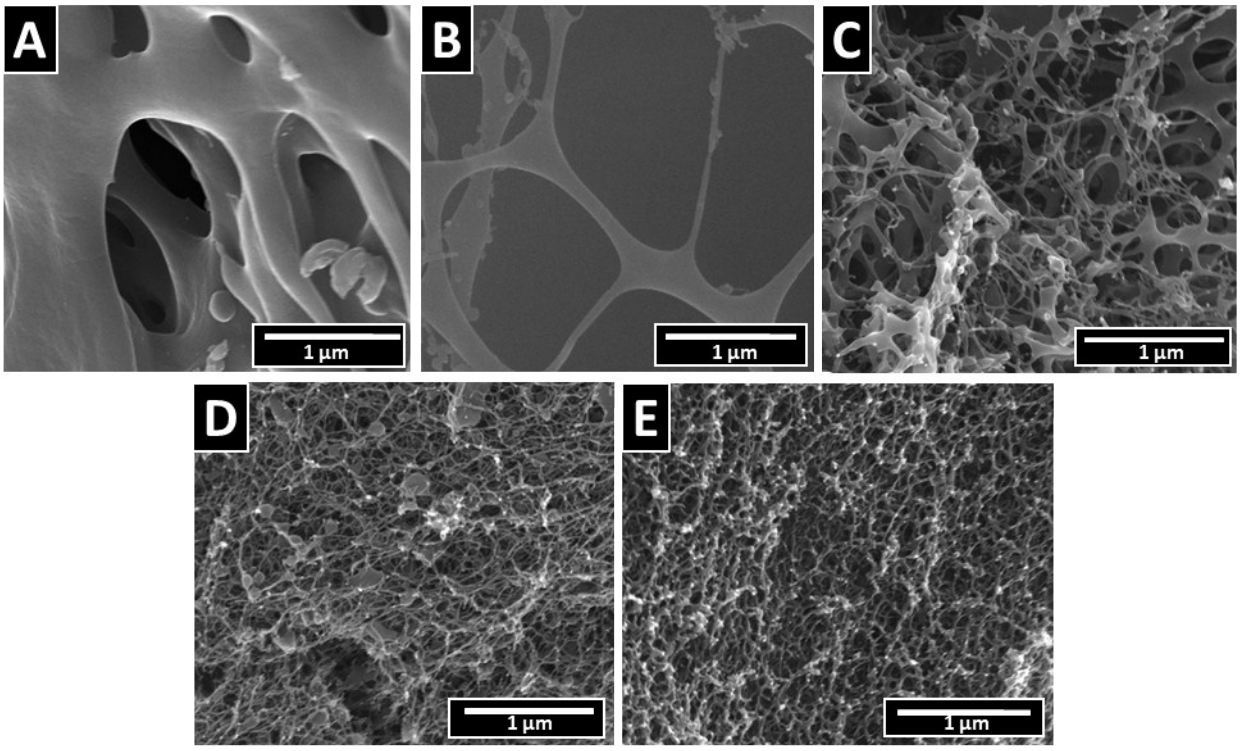

Figure S2. Scanning electron micrographs of dehydrated gels with varying aFSFG concentrations copolymerized with acrylamide and bisacrylamide: control with (A) no aFSFG, (B) 100 mM aFSFG, (C) 200 mM aFSFG, (D) 300 mM aFSFG and (E) 400 mM aFSFG. In all of these gels, the concentrations of acrylamide and bisacrylamide remained constant at 685 mM and 8.4 mM respectively.

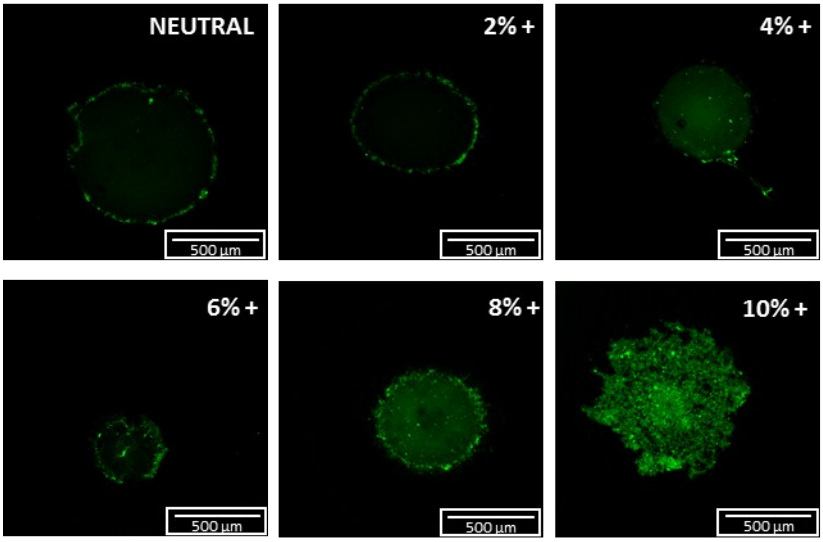

Figure S3. Representative fluorescence micrographs of GFP-Impβ entry into positively charged aFSFG hydrogels.

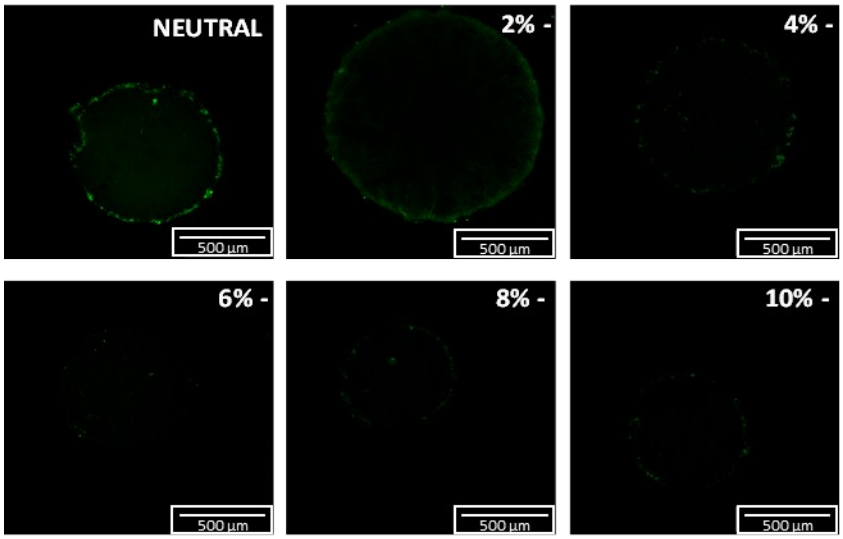

Figure S4. Representative fluorescence micrographs of GFP-Impβ entry into negatively charged aFSFG hydrogels.

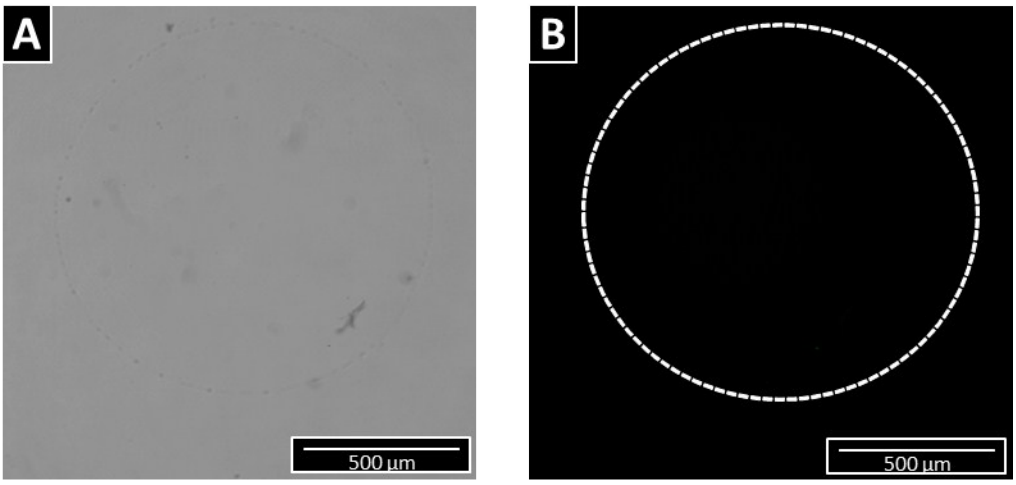

Figure S5. (A) Brightfield and (B) fluorescence micrographs of a 15% positively charged polyacrylamide hydrogel with no aFSFG peptide after incubation in GFP-Impβ. The interface of the gel and surrounding solution is represented with a dashed line in the fluorescence micrograph. No entry of the tagged protein into the gel is visible.

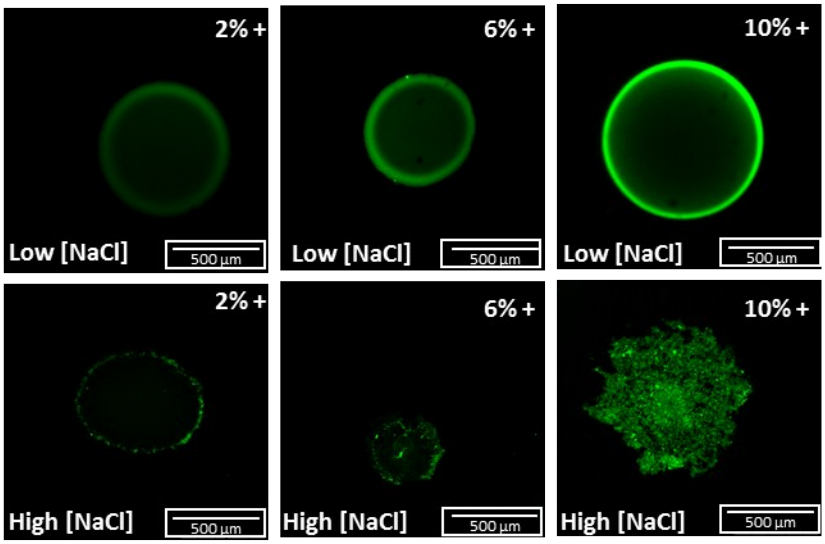

Figure S6. Representative fluorescence micrographs of GFP-Impβ entry into hydrogels prepared with low (10 mM) and high (200 mM) NaCl concentration.

[aFSFG] (mM)	Hydration Value
0	3.23
50	3.87
100	0.43
200	0.40

Table S1. Hydration values measured on bulk hydrogels with different aFSFG concentrations. Briefly, the hydration value was determined from Equation S1:

$$Hydration\ Value = \frac{M_t - M_o}{M_o}, \qquad \text{(S1)}$$

in which M_t is the mass of the swollen hydrogel after equilibration in buffer and M_o is the mass of the initial dried gel before any hydration. The hydration value is a measure of swelling – a greater hydration value indicates increased swelling and, thus, a more flexible gel with lower elastic modulus. The elastic modulus (E) relates to the average molecular weight between crosslinks (M_c):

$$E = 3\rho RT/M_c \qquad \text{(S2)}$$

Here, R is the gas constant, T is the temperature and ρ is the polymer density. Thus, a gel with an elevated hydration value has a greater M_c value, or less crosslinking, than a gel with less swelling. From these preliminary data, we can conclude that gels with greater aFSFG concentrations have less swelling and, thus, are more crosslinked than gels with low or no aFSFG.