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Ion-Mediated Swelling in a Model of Gastric Mucus Gel OWEN LEWIS, Florida State University, JAMES KEENER, AARON FOGELSON, University of Utah — The gastric mucus layer serves a protective function in the human stomach, shielding the epithelium from the digestive machinery of the stomach, but It is not understood how this gel layer is maintained *in vivo*. Mucus degradation via digestion of the gel network at the lumen must be balanced by secretion and swelling of new mucus at the stomach wall. These processes, are dependent on the local ionic composition of the gel solvent, which varies throughout the layer. Here, we present a comprehensive model of mucus-like polyelectrolyte gel based on a two-phase framework. This model extends classical theory to account for the dependence of the Flory interaction parameter and standard free energies on transient, ion-mediated crosslinks within the gel network. We present a computational investigation of the dynamic swelling behavior of the model. In particular, we quantify the rate at which a globule of crosslinked gel swells when exposed to an ionic bath as a function of bath concentration and network chemistry. We show that the swelling rate has a non-monotone dependence on the molarity of the bath solution, in part due to the existence of an additional chemical pressure not predicted by classical theory.

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