

Abstract Submitted  
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**Charge-regularized swelling kinetics of polyelectrolyte gels<sup>1</sup>**

SWATI SEN<sup>2</sup>, ARINDAM KUNDAGRAMI<sup>3</sup>, Indian Institute of Science Education and Research (IISER) Kolkata, Mohanpur 741246, India — The swelling kinetics of polyelectrolyte gels with fixed[1] and variable degrees of ionization in salt-free solvent is studied by solving the constitutive equation of motion of the spatially and temporally varying displacement variable. Two methods for the swelling kinetics - the *Bulk Modulus Method* (BMM), which uses a linear stress-strain relationship (and, hence a bulk modulus), and the *Stress Relaxation Method* (SRM)[1], which uses a phenomenological expression of osmotic stress, are explored to provide the spatio-temporal profiles for polymer density, osmotic stress, and degree of ionization, along with the time evolution of the gel size. Further, we obtain an analytical expression for the elastic modulus for linearized stress in the limit of small deformations. We match our theoretical profiles with the experiments of swelling of PNIPAM (uncharged) and Imidazolium-based (charged) minigels available in the literature. (1) S. Sen and A. Kundagrami, J. Chem. Phys. **143**, 224904 (2015).

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