

Abstract Submitted
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Impurity effects in thermal regelation.¹ NAVANEETH KIZHAKKE MARATH, IIT Ropar, JOHN WETTLAUFER, Yale University, NORDITA — When a particle is placed in a material with a lower bulk melting temperature, intermolecular forces can lead to the existence of a “premelted” liquid film of the lower melting temperature material. Despite the system being below the melting temperatures of both solids, the liquid film is a consequence of thermodynamic equilibrium, controlled by intermolecular, ionic and other interactions. An imposed temperature gradient drives the translation of the particle by a process of melting and refreezing known as “thermal regelation”. We calculate the rate of regelation of spherical particles surrounded by premelted films that contain ionic impurities. The impurities enhance the rate of motion thereby influencing the dynamics of single particles and distributions of particles, which we describe in addition to the consequences of it in the context of dating of ice cores.

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