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Glass Formability of Aqueous Solutions, and the Critical Nucleation Radius of Cubic Ice RYAN DUNN, MATTHEW WARKENTIN, ROBERT THORNE, Cornell University — We have determined critical cooling rates and critical warming rates for a range of concentrations of different solutes in aqueous solutions using high-speed video microscopy. Our results show that the glass formability of aqueous solutions is exponential in the concentration for all solutes tested, with a different characteristic concentration for each solute. The characteristic concentration correlates with molecular radius. A simple modification of critical droplet theory relates the characteristic concentration to the critical nucleation radius in pure water, and explains the relationship between molecular radius and the characteristic. This simple, general theory of glass formability in aqueous solutions is important at a fundamental level, and will also have broad consequences for the field of cryobiology.

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