

Crystal to glass cooling model developed

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University of Tokyo scientists have discovered why cooling sometimes causes liquid molecules to form disordered glasses, rather than ordered crystals.

Researchers Hiroshi Shintani and Hajime Tanaka have developed a two-dimensional model of a simple molecular system that can be tuned continuously from one state to another, including from a crystal to a plastic crystal to a glass containing crystalline clusters.

The authors take a liquid model whose molecules would naturally form an ordered crystalline structure and add a potential favoring formation of disordered clusters of five-fold crystals. The resulting frustration in the system can then be controlled to alter the degree to which the ordered structure is formed, against the number of disordered clusters within the liquid.

They say they are able to show the liquid naturally forms both types of structure in a dynamic system. The presence of the domains provides a natural explanation for the dramatic slowing down of the dynamics in a glassy system.

The research is explained in the March issue of Nature Physics.

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