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Developing novel Cryoprotectant mixtures utilizing Molecular Dynamics Simulations.

ABSTRACT:
Solidification processes are common occurrences in our daily lives and an important process in industrial food production. Yet, there is currently a lack of information on the detailed molecular processes of freezing foods. Understanding such processes is relevant in the freezing of seafood and animal muscle tissue for preservation and long-term storage to ensure the quality of such foods. Introducing additives like carbohydrate cryoprotectants and salts have been shown to extend shelf life of seafood and significantly improve quality. However, a fundamental understanding of how these cryoprotectants serve to prevent frozen damage to such foods is unclear from a microscopic molecular perspective. Computer simulation techniques offer unique insights into such complex molecular environments, as it avoids the limitations of current experiments and can be used in tandem with experiments to support experimental observations. This seminar will present some novel molecular dynamics simulation methodologies and its application to help develop cryoprotectants for food and other relevant systems