

Crystallization of Polyethylene Glycol in Polyethylene Glycol – Sucrose Solutions During Freeze-Thawing and In Situ Freeze-Drying

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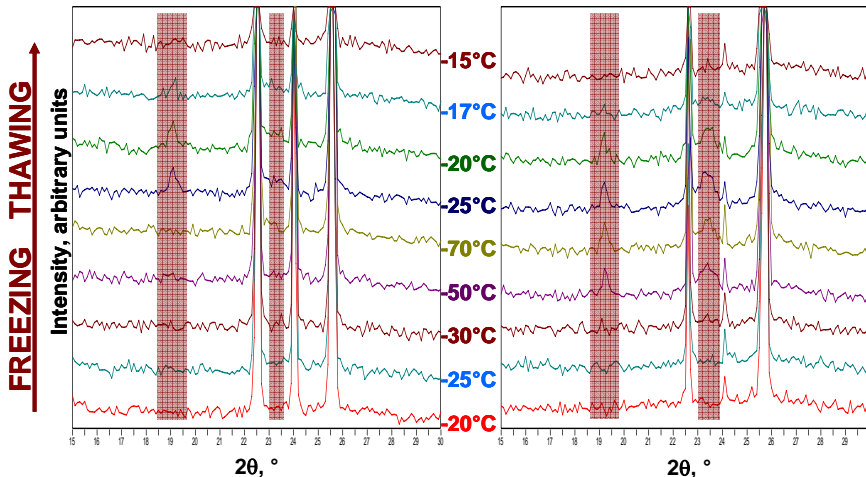
NNIN Facility utilized: Characterization Facility

Objectives

- To study the phase behavior in frozen PEG and PEG–Sucrose solutions during freeze-thawing
- To improve the sensitivity of the XRD signal during *in situ* freeze-drying for quantification of PEG crystallization during freezing and drying stages of lyophilization

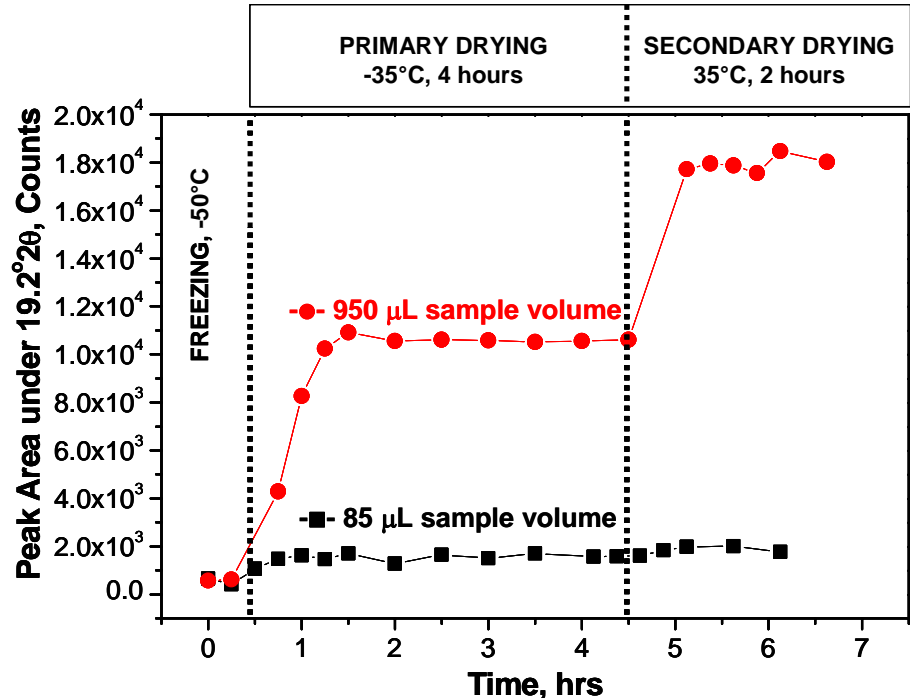
Freeze-thawing of PEG: Sucrose Solutions

2% w/v PEG + 2% w/v Sucrose 10% w/v PEG + 10% w/v Sucrose



PEG peaks disappeared at $\sim -15^\circ\text{C}$ similar to the $T_{\text{eutectic melt}}$ observed using Differential Scanning Calorimetry ($\sim -16^\circ\text{C}$).

In Situ Freeze-drying of 2% W/V PEG



Results

- The XRD signal was substantially enhanced with a 950 μL sample volume during *in situ* freeze-drying; thus enabling quantification of PEG crystallization during freezing, primary, and secondary drying.