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Liquid Condensation and Solidification Behavior of Hydrogen Isotopes in Foams

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Disclaimer

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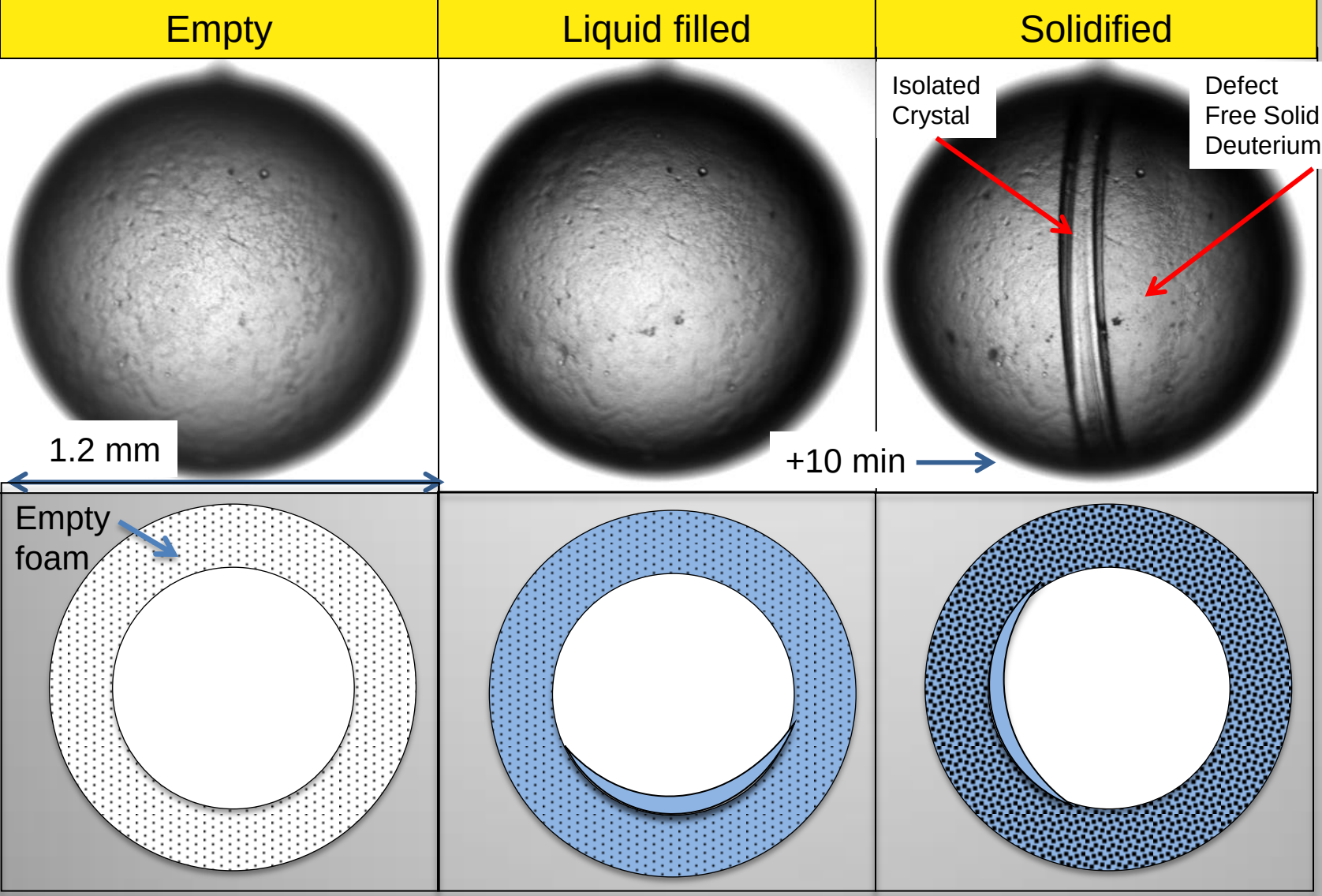

A foam shell, 1.2 mm outer diameter with a 35 µm thick foam layer is used to quickly form a solid deuterium layer for ICF. The top row shows the visible light microscope image and the bottom row shows a corresponding schematic representation. The left most image shows the empty foam shell, with the dark and light patches due to the foam imperfections. The middle image shows the foam shell with liquid deuterium filling the foam. In this case, the liquid level exceeds the foam level because the deuterium will shrink when it freezes. The right image is taken 10 minutes after the center image, after the temperature was reduced by 2 K to freeze the deuterium. This image shows that the majority of the solid deuterium has no observable defects, with the exception of the isolated crystal that formed on the foam surface. The next step is to get the correct level of liquid and cooling rate to prevent the extra crystal on the surface. In contrast, typical ICF DT fuel layers require ~13 hours to solidify in order to be defect free with a success rate of approximately 20%.

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