

The mesoscale morphologies of ice films: Porous and biomorphic forms of ice under astrophysical conditions

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I present the results of experiments in which we grow submicrometer- to millimeter-thick ice films at temperatures of 6 to 220 K at low pressures in situ in a cryo environmental scanning electron microscope. We find that ice films show pronounced morphologies at the mesoscale similar to those previously described in films of ceramics, semiconductors, and metals; materials with quite different material properties to ice. Our experiments are aimed at revealing the mesoscale morphologies of amorphous and crystalline ice with regard to astrophysical environments, as the conditions in which the ice films grow in our experiments are those under which exists most extraterrestrial ice. The porosity on the mesoscale of many of the morphologies is notable in this regard; a further intriguing finding is that these ice films can emulate biological forms.

References

- [1] JHE Cartwright, B Escribano, & CI Sainz-Díaz, *Astrophysical Journal*, 687, 1406-1414, 2008.