

The Icy Universe

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Volatile molecules and refractory dust are the building blocks of dense clouds, protoplanetary envelopes and disks, and planetary systems. Their formation pathways hold key information on the formation of astronomical objects, and, eventually, life. Telescope observations, laboratory simulations, and model calculations show that icy grain mantles (H₂O, NH₃, CO, CO₂, CH₃OH, et cetera) play an important role in molecule, and possibly dust formation. I will discuss how observations constrain the molecule formation pathways and how the ice absorption, scattering, and emission bands can be used to trace the physical history of their environment.