

## Crystalline Ice-Directed Self-Assembly of Conducting Polymer Nanofilm

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Ice crystals fabricated at atmospheric pressure are hexagonal columns or plates, with the top and bottom faces as the basal face, and the six side faces as the prism face. Controlling ice crystal growth is a grand scientific challenge with major technological impacts. A novel feature is that controlling ice crystal face growth gives a mono-crystal system having various hydrogen bonding-capable surfaces. The well-controlled surface gives an environment to organize organic molecules into fine thin layers. In this study, macroscopic single-crystal ices were fabricated with basal, primary prism, and secondary prism faces exposed. Assembled aniline molecules with dopant directed by the various surfaces were polymerized to form the conducting polymer nanofilms. We found that electrical conductivities of the nanofilms changed drastically depending on the ice surfaces that we were able to control for the first time.