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On the structure and morphology of poly (vinylidene fluoride) nanoscrolls GABRIEL BURKS, SARAH GLEESON, SHAN MEI, HAO QI, CHRISTOPHER LI, Drexel University — Beyond its widely popular piezoelectric effect and β-phase molecular conformation, poly (vinylidene fluoride) PVDF also offers great intrigue as it relates to understanding its intrinsic crystallization behavior and morphological preference. It has been suggested that the γ-phase of PVDF adopts a highly regular scrolling lamellar habit which can be attributed to small differences in the folding volume of atomic level hydrogen and fluorine atoms resulting in the evolution of highly curved polymer lamellae. To date this scrolled morphology of γ-phase PVDF has been witnessed via high temperature melt crystallization of crystalline thin films and via severe chemical etching of PVDF bulk films. Here we show the first growth of free-standing γ-phase PVDF scrolls via the solution crystallization technique. Differential scanning calorimetry (DSC), X-Ray Diffraction (XRD), Fourier Transformed-Infrared Spectroscopy (FT-IR), and Atomic Force Microscopy (AFM) have been used to both characterize and to further understand the fundamental preferred crystalline habit of the γ-phase of poly (vinylidene fluoride).

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