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Supercritical Fluid-Assisted Electrospinning of Polymers MARK MCHUGH, Virginia Commonwealth University, MANUEL MARQUEZ, Phlip Morris USA, ZHIHAO SHEN, Philip Morris USA Postgraduate Research Program, JUN LIU, Virginia Commonwealth University, SANHO LEE, Dong-A University — In this talk we describe the application of near-critical and supercritical CO_2 as an electrospinning processing aid to create fibers with novel morphology readily varied by adjusting the operating pressure and temperature. We demonstrate the application of CO_2 to electrospin poly(vinyl pyrrolidone) (PVP) from PVP-dichloromethane (DCM) solutions. The formation of PVP fibers is directly related to the DCM-CO_2 phase behavior since the electrospinning operating pressures are well below those needed to dissolve neat PVP in CO_2. In addition, when spinning into a CO_2-rich bath, an open-cell fiber morphology is created with features that correlate with the operating pressure. We emphasize in the talk that extreme pressures are not needed to tailor a specific morphology when using CO_2. The effective removal of the solvent from the polymer solution depends on the partitioning of the liquid solvent between the PVP-rich phase and the CO_2-rich phase so the thermodynamics of polymer-SCF solvent phase behavior plays a significant role in this process.

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