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Tailoring the Properties of Poly(ethylene terephthalate) without Addition of Fillers via Solid-State Shear Pulverization CYNTHIA PIERRE, KOSMAS KASIMATIS, JOHN TORKELSON, Northwestern University — We demonstrate the ability to very strongly tune the physical and mechanical properties of poly(ethylene terephthalate) (PET) by changing the processing conditions of neat PET during solid-state shear pulverization without addition of any fillers or nucleating agents. Using differential scanning calorimetry, we observe a roughly factor of 3 increase in crystallinity of PET that has been pulverized and subsequently melted relative to the unprocessed PET. We also observe a dramatic increase in the rate of crystallization of the pulverized samples. Rheological characterization has demonstrated an increase in viscosity of the pulverized material, which can be ascribed to chain branching in the pulverized product. We also observe significant reductions in the oxygen permeability of the PET with pulverization as well as enhancements in mechanical properties that are commensurate with the modified crystallization properties of the pulverized PET.

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