polymers

MDPI

Supporting Information

Article

Preparation of Polyethylene and Ethylene/Methacrylic Acid Copolymer Blend Films with Tunable Surface Properties through Manipulating Processing Parameters during Film Blowing

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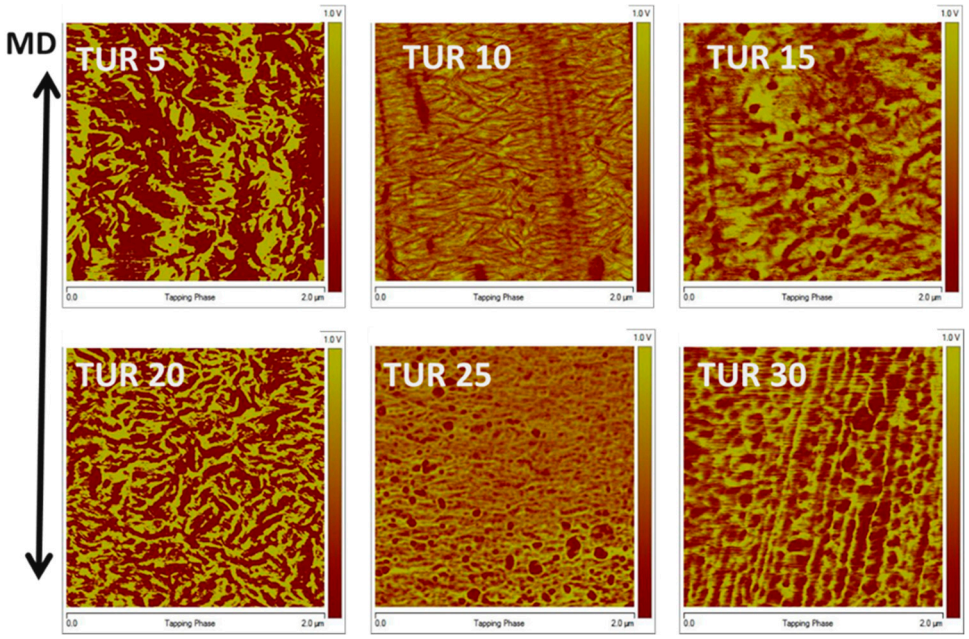

Figure S1. AFM phase images of PE-EMAA film obtained at different TURs.

Table S1. Film Thickness of PE-EMAA films obtained under different TURs.

TUR	Experimental Thickness* (μm)
5	112.0
10	82.0
15	65.0
20	44.0
25	34.0
30	28.0

*Error ±10%.

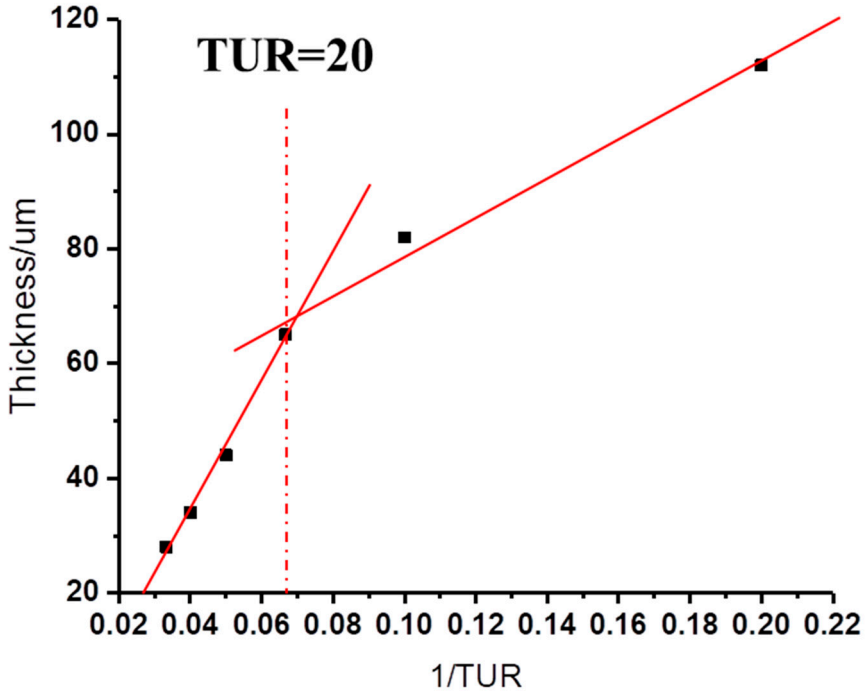

Figure S2. Film thickness vs. the inverse of TUR.

The film thickness is inversely proportional to TUR, and can be expressed as[1]

$$\mathrm{H} = \frac{(a_o^2 - a_i^2)}{2a_0}\left(\frac{\rho_m}{\rho_s}\right)\frac{1}{(BUR)(TUR)} \quad (1)$$

where a_o and a_i are the outer and inner radiuses of die, ρ_m and ρ_s are the densities of film in melt and solid states. However, the measured thicknesses are not monotonically proportional to 1/TUR. This suggests the complicated nature of the PE/EMAA blends, where other parameters need to be considered. The origin of such phenomenon requires detailed microstructure evolution information of the blend films, which will be published elsewhere.

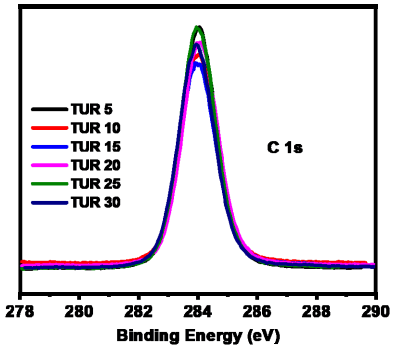

Figure S3. XPS C_{1s} lineshape at various TURs.

References:

1. Kwack, T. H.; Han, C. D. Rheology-processing-property Relationships in Tubular Blown Film Extrusion. II. Low-pressure Low-density Polyethylene. *J. Appl. Polym. Sci.* **1983**, *28* (11), 3419–3433.