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Crystallization of Ultrathin Poly(3-hydroxybutyrate) Films in Blends with Small Amounts of Poly(L-lactic acid): Correlation between Film Thickness and Molecular Weight of Poly(L-lactic acid)

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Table 1. Radius gyration (R_g) of PHB and PLLA

M_w (g mol^{-1})	R_g (nm)	$2R_g$ (nm)
PHB		
650,000	39	78.1
PLLAs		
300,000	29.8	59.5
100,000	15.9	31.7
50,000	10.7	21.3
23,000	6.8	13.6
13,100	5.6	11.1
6,900	4.9	9.9
3,600	3.4	6.8
710	2.6	5.2

Radius of gyration (R_g) of PHB and PLLA was calculated using Mark-Howink and Flory-Fox equations:

Mark-Howink Equation: $[\eta] = K\,M^{\alpha}$ where, $[\eta]$ = intrinsic viscosity

K, α = Mark-Howink parameters.

For PHB, K= 1.18x10^{-4} and α= 0.78[1]

For PLLA, K= 4.41x10^{-4} and α= 0.72[2,3]

Flory-Fox Equation: $R_g = \frac{1}{\sqrt{6}}\left(\frac{[\eta]\,M}{\phi}\right)^{1/3}$ where, M = molecular weight (g mol^{-1})

ϕ = Flory viscosity constant (3x10^{-24} /mol)

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