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Electronic Supplementary Information

2021 Pioneering Investigator Issue: Mesoporous Polyetherimide Thin Films

via Hydrolysis of Polylactide-b-Polyetherimide-b-Polylactide

Dong Guo,^a Jocelyn Riet,^b Assad Khan,^a Yichen Guo,^a Zhen Xu,^a Tianyu Liu,^a Guoliang Liu^{*a,c,d}

^aDepartment of Chemistry, ^bDepartment of Chemical Engineering, ^cMacromolecules Innovation

Institute, and ^cDivision of Nanoscience, Academy of Integrated Science, Virginia Tech,

Blacksburg, Virginia 24061, United States

*E-mail: <u>gliu1@vt.edu</u>

Entry	<i>M_n</i> of PEI (kDa)	$arphi_{\it PLA}$ by ¹ H NMR (%)	$arphi_{\it PLA}$ by TGA (%)
AIA-12	11.5	38.8	38.5
AIA-16	16.1	37.5	37.3
AIA-20	20.4	37.6	37.3
AIA-25	25.4	37.8	37.3
AIA-30	30.3	37.2	36.6
AIA-45	44.6	38.8	39.8
AIA-60	60.0	38.4	38.1
AIA-75	74.8	38.2	38.0



Fig. S1 SEC traces of a series of low-molecular-weight AIA and the corresponding PEI macroinitiators. The shorter retention times of AIA than those of the corresponding PEI macroinitiator confirm the successful synthesis of AIA.



Fig. S2 TGA of a series of low-molecular-weight AIA, PEI and PLA. The first and second weight loss of AIA at 180 – 300 °C and above 450 °C were assigned to the thermal decomposition of PLA and PEI, respectively. According to the weight loss, the weight fractions of PLA in AIA was approximately 40%.



Fig. S3 SEM images of oxygen-plasma-etched AIA-30 hydrolyzed for (a) 0, (b) 1, (c) 3 and (d) 10 days.



Fig. S4 SEM images of hydrolyzed AIA. (a, f, k) AIA-12, (b, g, l) AIA-16, (c, h, m) AIA-20, (d, i, n) AIA-25, and (e, j, o) AIA-30 triblock copolymers (a-e) after oxygen plasma etching, (f-j) after hydrolysis for 1 d, and (k-o) after hydrolysis for 10 d. After 10-d hydrolysis, AIA-12, AIA-16, and AIA-20 displayed collapsed structures, but AIA-25 and AIA-30 partially retained the mesoporous structures. The scale bars represent 100 nm.



Fig. S5 Photographs of mesoporous polyetherimide (MP) films after 9-day hydrolysis. If the molecular weight of constituent polyetherimide was lower than 45 kDa, the film appeared fairly brittle, *i.e.*, MP-12, -16, -20, -25 and 30. In contrast, MP-45, -60 and -75 exhibited good structural integrity and mechanical performance.



Fig. S6 Cross sections of mesoporous PEI films after 9-day hydrolysis. The morphologies of (a)MP-45, (b) MP-60 and (c) MP-75 are displayed.