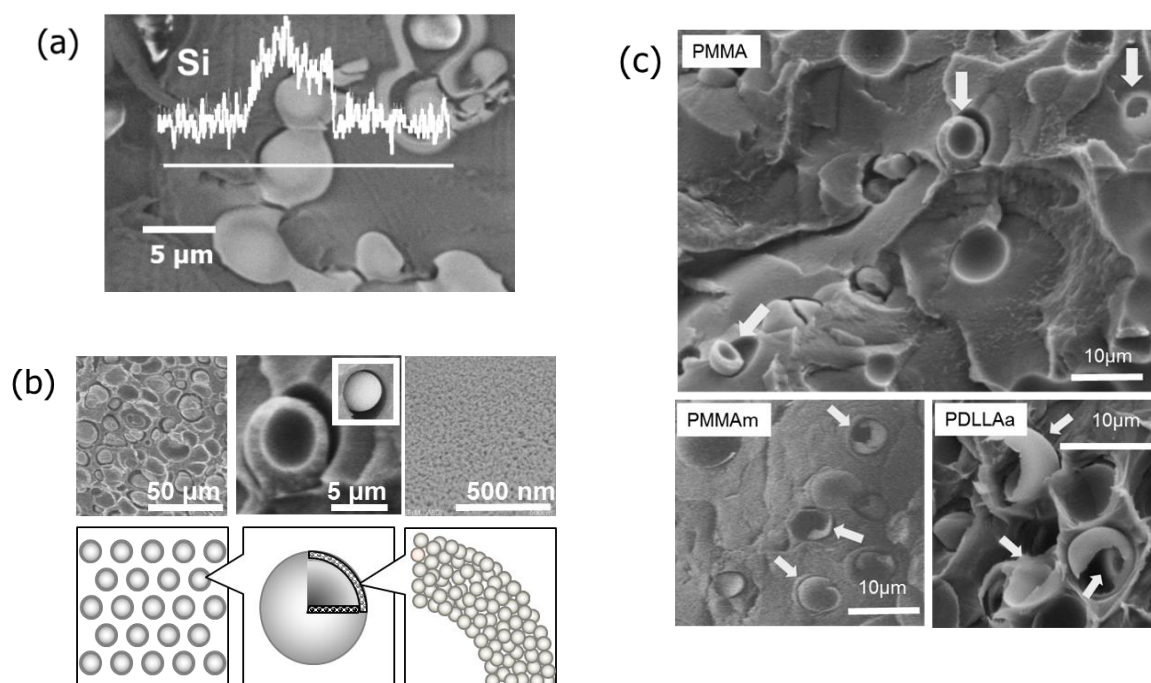


Supplement Table 1 List of polymers in this work

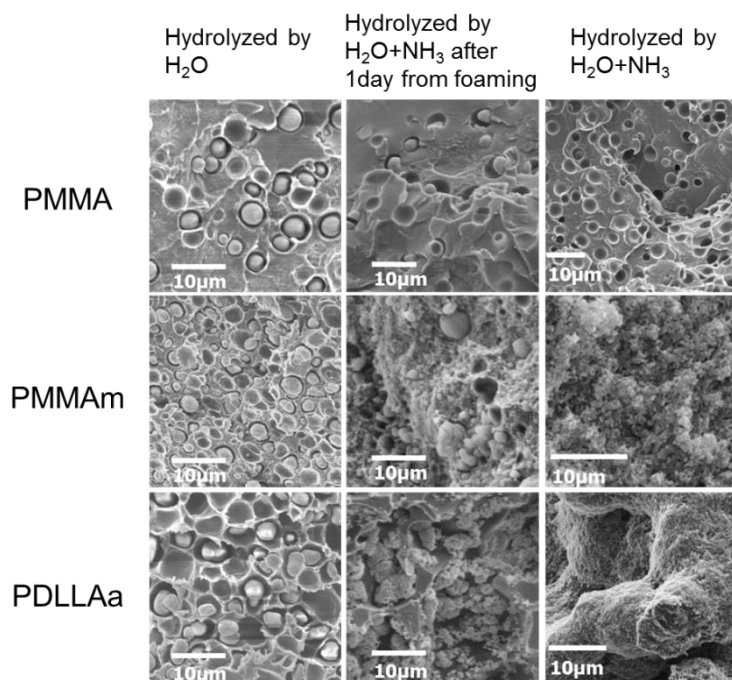
	Supplier	Product Name	Chemical name / formula	Average Molecular Weight	Tg °C	Tm °C
PDLLA	Natureworks	Biopolymer 4032D	Poly (D, L-lactic acid)	Mw=155,000 <sup>a</sup>	58 <sup>b</sup>	160
PDLLAa	Natureworks	Biopolymer 4060D	Poly (D, L-lactic acid)	Mw=158,000 <sup>a</sup>	56 <sup>b</sup>	
PMMA	Sigma Aldrich		Poly (methyl methacrylate)	Mw=120,000	105	
PMMAm	Mitsubishi Rayon	Acrypet IRK304 <sup>c</sup>	Poly (methyl methacrylate)	Mw=80,000 <sup>a</sup>	117 <sup>b</sup>	
PS	Sigma Aldrich		Poly (styrene)	Mw=280,000	100	
PET	Sigma Aldrich		Poly (ethylene telephthalate)	Mv = 18,000	81	
LDPE	Sigma Aldrich		Poly(ethylene), low density			116
PP	Chisso Petrochemical	FH3400	Porly(propyrene)	Mw=229, 000		165

a: Evaluated in our laboratory by gel permeation chromatography (GPC).

b: Evaluated in our laboratory by DSC. Other properties are depends on suppliers' reference. C: Impact-resistant variant



**Supplement Fig. 1** (a) SEM micrographs of PMMA-Silica composite with line analysis of silicon content. (b) Schematic diagram of “Vespula-like” composites with SEM micrographs of PMMA-Silica composite. (c) Typical capsular structures in samples.



**Supplement Fig. 2** SEM micrographs of samples prepared by hydrolysis with  $0.1 \text{ mol/dm}^3$  ammonium solution after 1 day from foaming (centre column) compared with samples hydrolyzed by water (left column) and that by  $0.1 \text{ mol/dm}^3$  ammonium solution (right column) .