

3D Printed Porous Silicone Polymer Composites Using Table Salt as a Sacrificial Template

Santosh Adhikari,^{*,1} Xavier M. Torres,¹ John R. Stockdale,¹ Shelbie A. Legett,¹ Lindsey B. Bezek,¹ Jesus A. Guajardo,¹ Adam Pacheco,¹ Karthik Ramasamy,² Bart Benedikt,³ Matthew Lewis³ and Andrea Labouriau^{*,1}

¹ C-CDE: Chemical Diagnostics and Engineering, Los Alamos National Laboratory, Los Alamos, NM 87545, USA

² SIGMA-1: Fabrication Manufacturing Science, Los Alamos National Laboratory, Los Alamos, NM 87545, USA

³ W-13: Advanced Engineering Analysis, Los Alamos National Laboratory, Los Alamos, NM 87545, USA

*Correspondence: san_adh@lanl.gov (S.A.); andrea@lanl.gov (A.L.)

Supporting Information

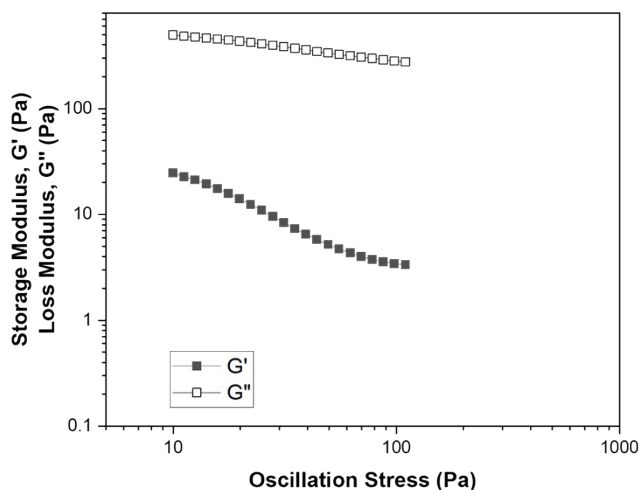


Figure S1: Storage and loss moduli as a function of oscillation stress for the grinded resin containing 50wt% of NaCl without filler (Sample P0).

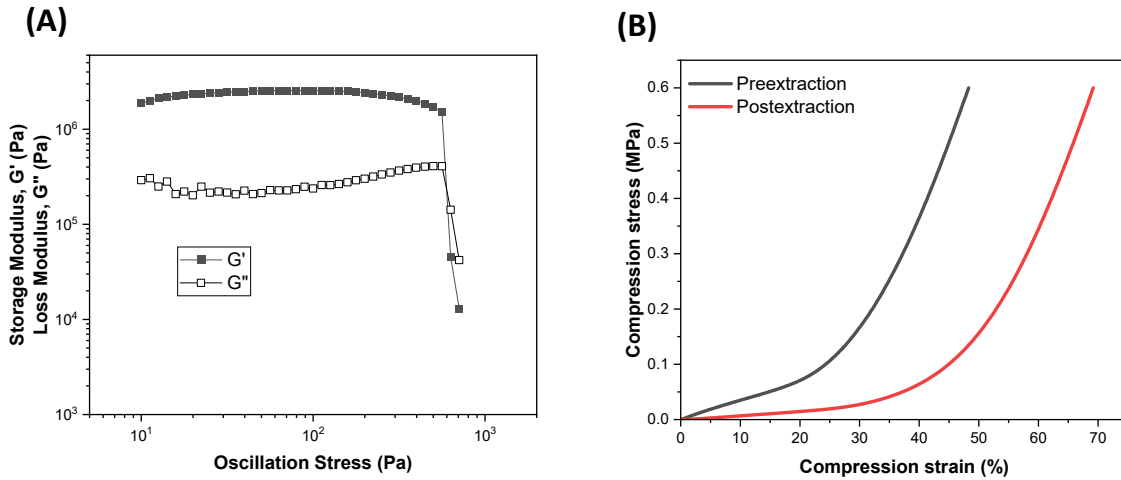


Figure S2: (A) Storage and loss moduli as a function of oscillation stress for the hydrogen getter composite resin and (B) Compressive stress strain curves of polymer getter composites before and after extraction of NaCl.

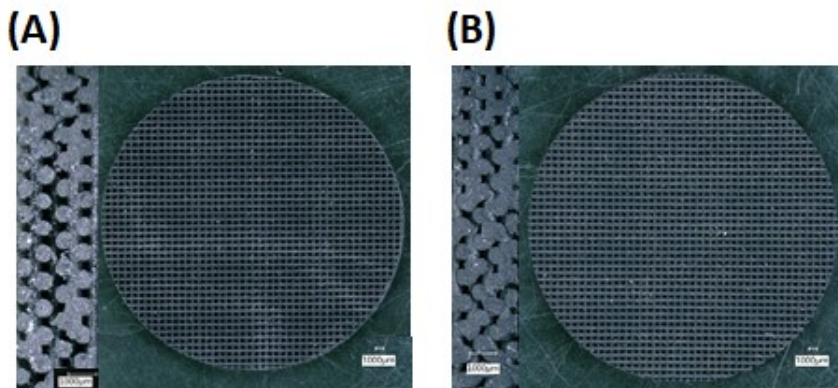


Figure S3: Cross-section view (left) and top view (right) of the optical microscope images of FCT pads of polymer getter composite (A) before and (B) after NaCl extraction.

Table S1: Summary of the rheology data for different polymer resins.

Sample	Yield Stress σ_y (Pa)	Equilibrium storage modulus G'_{eq} (Pa)	Initial Complex Viscosity (Pa*s)
P1	7128	371251	46645
P2	89	37659	4517
P3	1066	1299600	172997

Table S2. Summary of the mechanical properties of the porous samples (results are average from the two runs)

Sample	Tensile test		Compressive strain at 0.6 MPa of compressive stress (%)
	Stress (MPa)	Strain (%)	
P1(before)	-	-	45 ± 2
P2 (before)	-	-	34 ± 3
P3 (before)	-	-	36 ± 4
P1(after)	0.52 ± 0.02	92 ± 3	55 ± 3
P2 (after)	0.54 ± 0.05	84 ± 5	48 ± 6
P3 (after)	0.97 ± 0.01	83 ± 5	53 ± 3
P0(after)	0.42 ± 0.06	126 ± 10	-

Table S3. Change in mass, density, and porosity of polymer getter before and after the extraction of NaCl.

Sample	Mass (g)		Change in mass (g)	Change in mass (%)	Density(g/cm ³)			Porosity of 3D printed pads (%)		Mass of functional filler (%)	
	Before	After			Bulk	Before	After	Before	After	Before	After
Polymer getter composite	3.056	1.535	1.521	49.8	1.412	0.756	0.415	46	70	10	20