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Electronic Supplementary Information

Design and preparation of quasi-spherical salt particles as water-soluble porogens to fabricate hydrophobic porous scaffolds for tissue engineering and tissue regeneration

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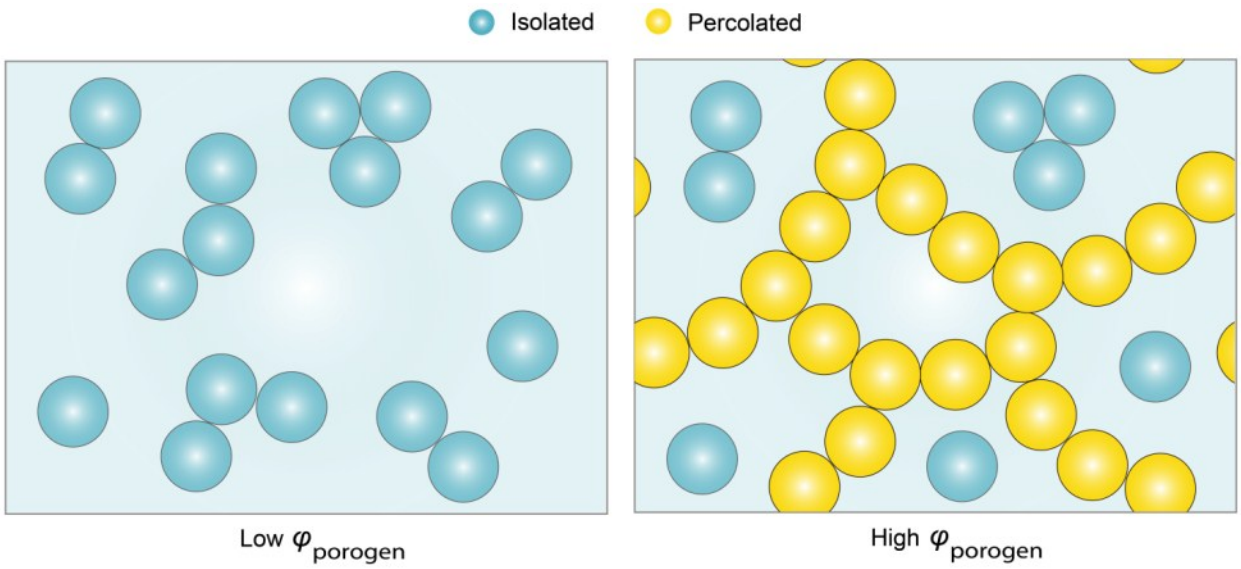

Fig. S1. Schematic presentation of non-percolated and percolated states of porogens at low (left) and high (right) porogen volume fractions.

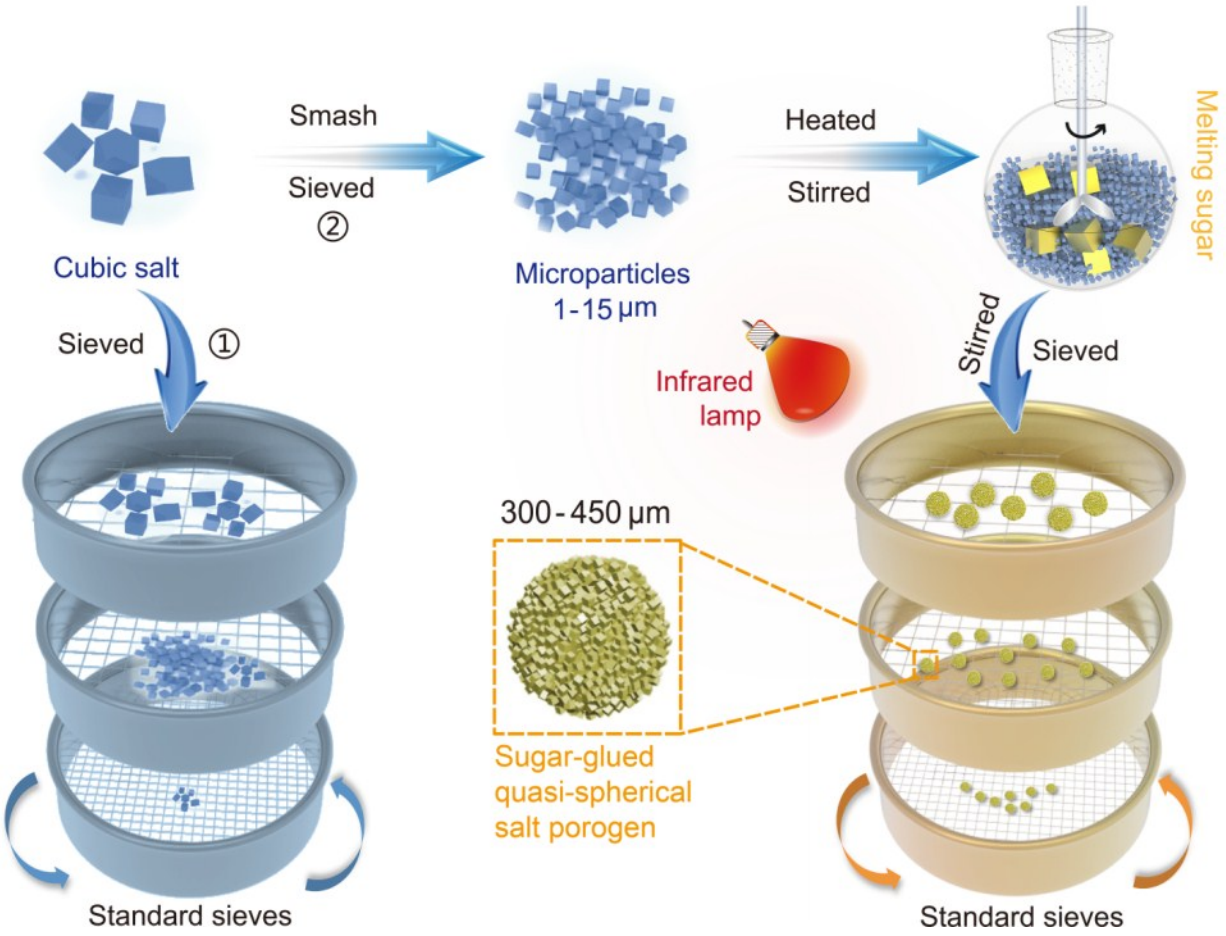

Fig. S2. Schematic of the procedure to prepare normal cubic salt particles and novel quasi-spherical sugar-glued salt particles.

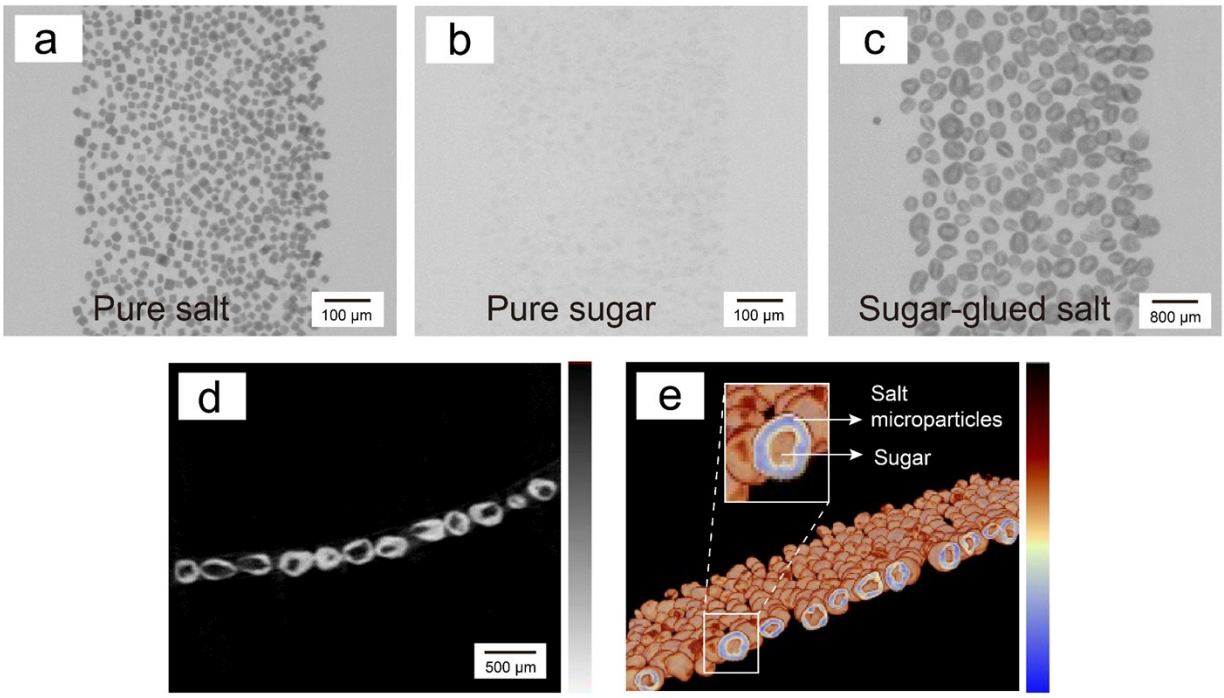

Fig. S3. The micro-CT images of pure salt (a), pure sugar (b) and sugar-glued salt porogen (c). The particles were stuck on a piece of foam prior to observations. A cross section of the sugar-glued salt porogens is presented in (d), and the realistic 3D visualization of sugar-glued salt porogens is shown in (e).

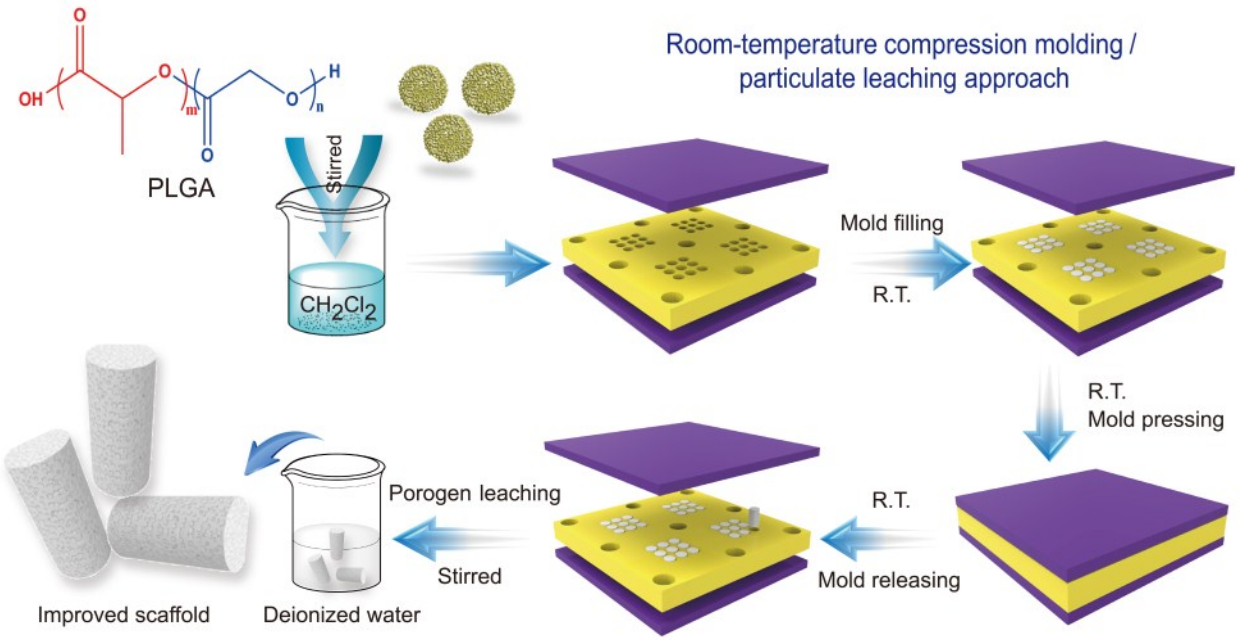

Fig. S4. Schematic of the chemical structure of the PLGA copolymer and the procedure to fabricate PLGA porous scaffolds using the water-soluble macroparticles as porogens.

Table S1. Ratio of PLGA and porogen, leaching time to remove water-solvable porogen, and porosity of resultant PLGA scaffolds

PLGA:Porogen (wt)	Porogen size (μm)	Leaching time (h)		Porosity (%)	
		Normal	Improved	Normal	Improved
1:16	300 - 450	15.1 ± 1.4	2.4 ± 0.7	91.9 ± 1.2	92.2 ± 1.9
1:14	300 - 450	16.2 ± 1.3	3.5 ± 1.0	89.5 ± 2.3	89.9 ± 1.8
1:12	300 - 450	17.6 ± 2.1	4.3 ± 1.1	87.2 ± 2.9	88.0 ± 1.9
1:10	300 - 450	25.6 ± 2.1	5.3 ± 0.6	84.8 ± 1.5	86.1 ± 1.3
1:8	300 - 450	34.4 ± 2.6	8.7 ± 0.8	82.9 ± 2.7	83.2 ± 2.8
1:4	300 - 450	38.9 ± 1.7	13.9 ± 2.7	76.9 ± 1.0	78.4 ± 1.8

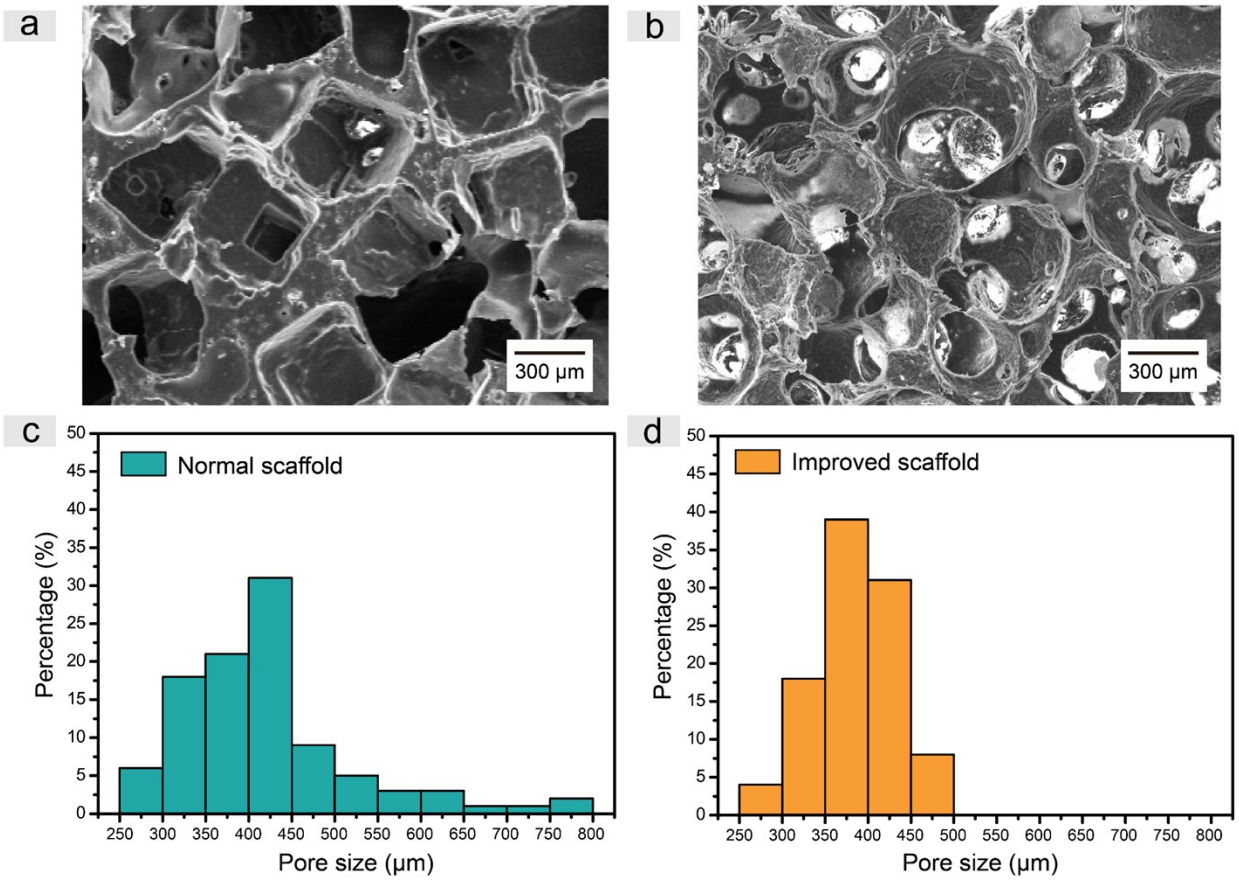

Fig. S5. Observations of pores in as-fabricated porous scaffolds. (a) and (b) SEM micrographs of normal and improved PLGA porous scaffolds with low magnification. (c) and (d) Distribution of pore size in the normal and improved PLGA porous scaffolds. At least 100 pores have joined in statistics for each kind of scaffolds. The wider pore distribution of the normal scaffold comes from higher probability of merging of nearest neighbor two macroparticle for the cubic porogens.

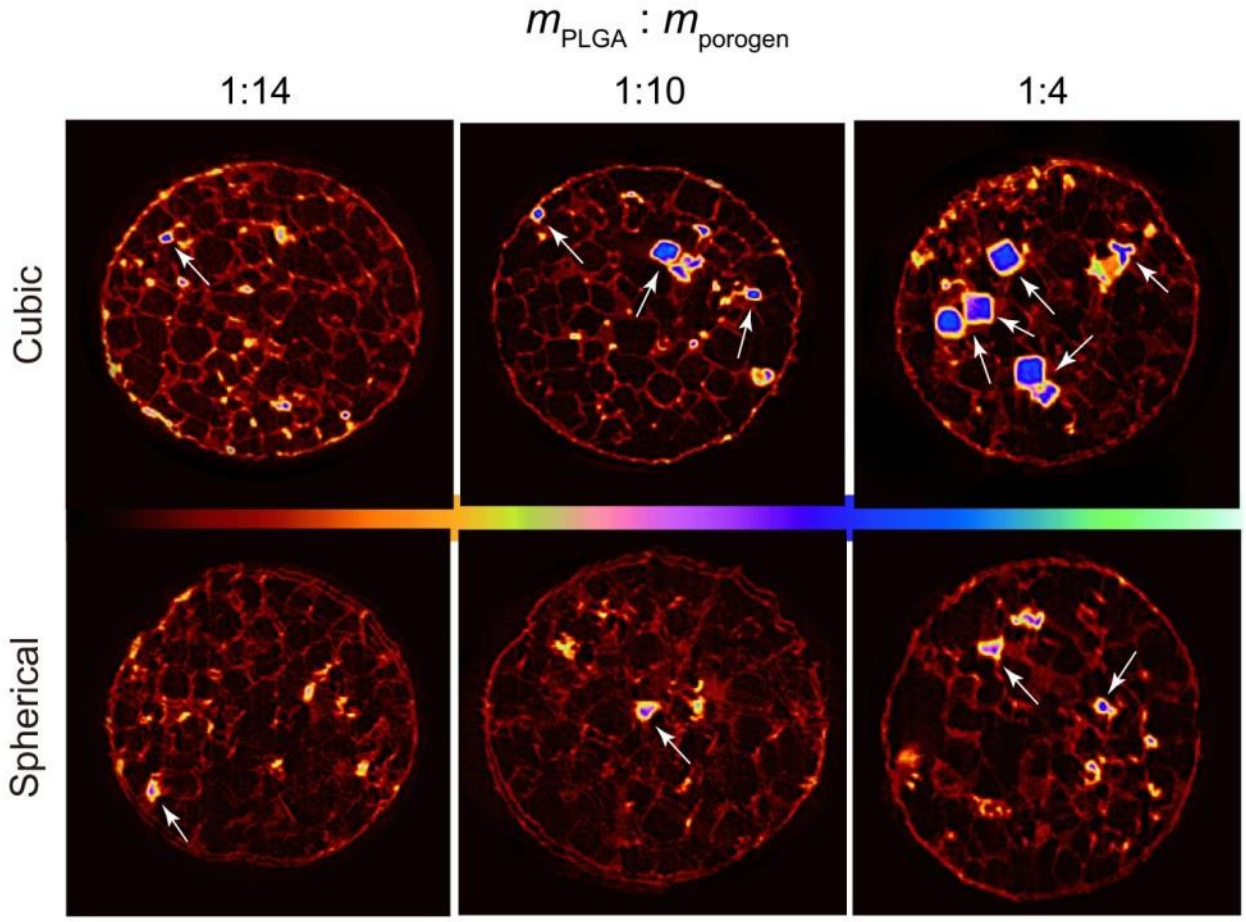

Fig. S6. The micro-CT images of PLGA porous scaffolds (diameter: 4 mm) using normal cubic salt or improved spherical salt as porogen. Prior to the micro-CT observations, the scaffolds experienced treatments of a $FeCl_3$ solution to enhance the contrast of the PLGA polymer matrix. Some residual inorganic salt particles are marked by arrows.

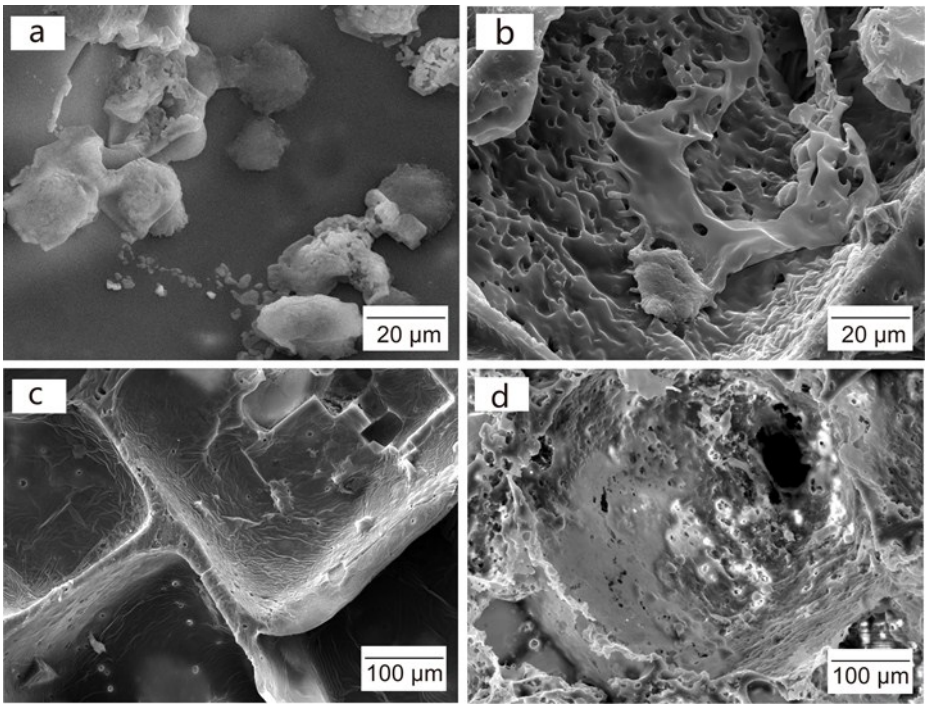

Fig. S7. SEM micrographs of MSCs on the pore walls of PLGA scaffolds that generated by cubic salt (a, c) and spherical sugar-glued salt (b, d) as porogen.