

### Supplementary Information

#### Constructing low-cost and high-strength ultra-low-density proppants based on the modification of activated carbon framework with in-situ hydrolyzed silane

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**Tab.S1. The molecular weight distribution of thermosetting phenolic resins (PFNH-230).**

Peak No	Mp	Mn	Mw	Mz	Mz+1	Mv	PD
1	1798	2515	7861	22579	46266	6532	3.12565
2	533	444	476	506	532	472	1.07207
3	174	168	175	183	190	174	1.04167

**Tab.S2. The viscosity of KH570 and PF.**

Sample	Rotor	rotation speed (rad/min)	viscosity (mPa.S)	Angle
KH570	Rotor 0	60	2.2	23.7%
PF/ethanol solution	Rotor 0	60	3.2	33.2%

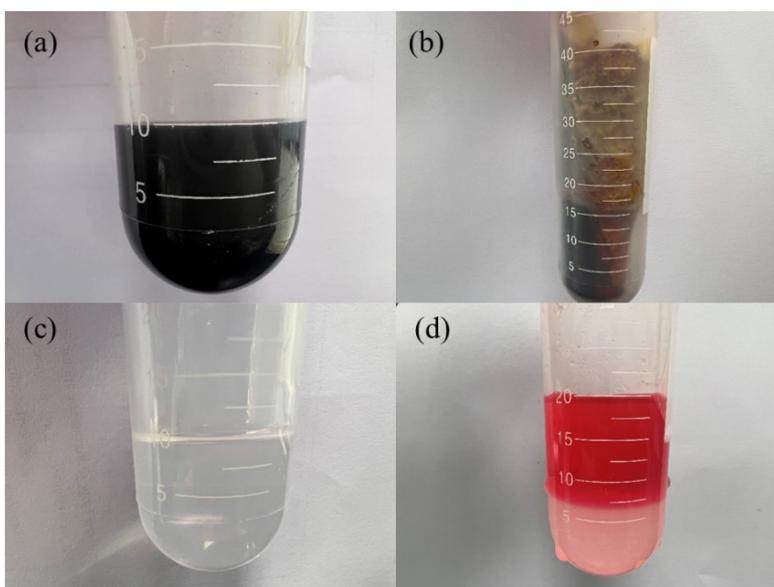


Fig. S1. The volume shrinkage comparison chart of phenol-formaldehyde resin and KH570. (a): Before curing of PF. (b): After curing of PF. (c): Before hydrolysis of KH570. (d): After hydrolysis of KH570.