

## Electronic Supplementary Information

### Preparation and characterization of new cement-based composite with sulphur polymer

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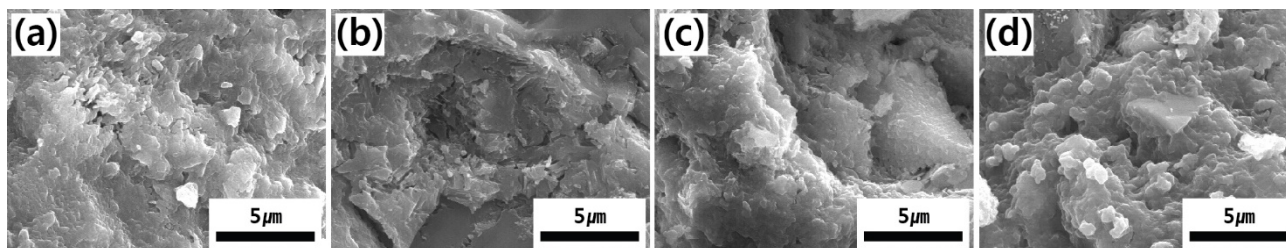
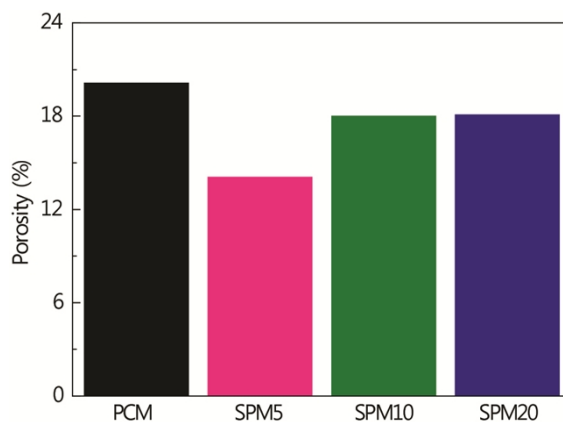


Fig. S1. SEM images of (a) PCM, (b) SPM5, (c) SPM10 and (d) SPM20 cured for 7 days, respectively.



20 Fig. S2. Total porosity of PCM, SPM5, SPM10 and SPM20 cured for 28 days.

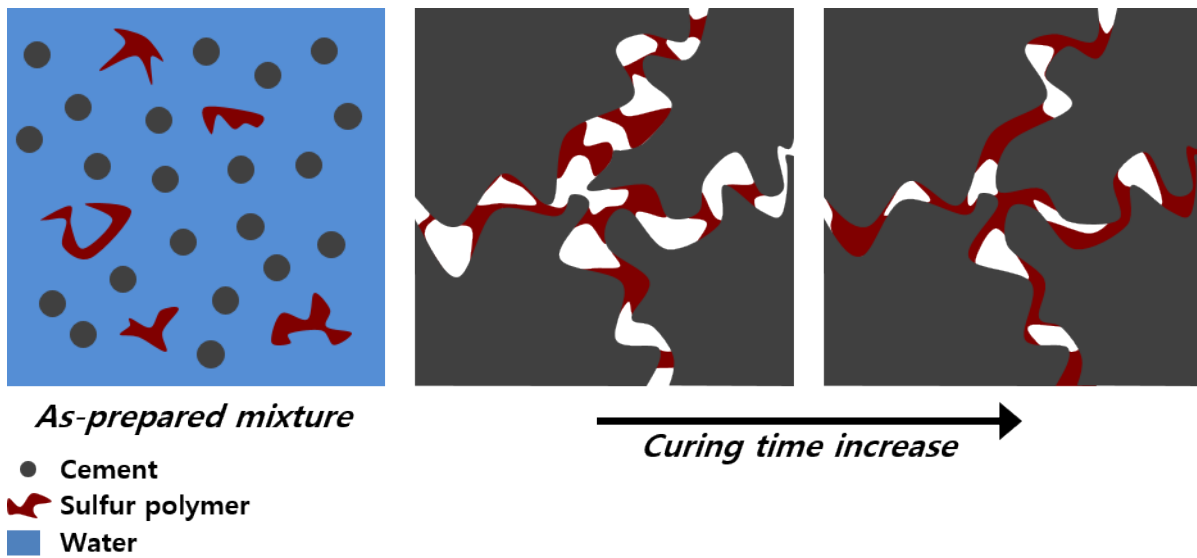


Fig. S3. Schematic illustration of the formation of sulfur polymer films in hardened cement with curing time. The incorporated sulfur polymer film gradually filled in pore between hydrates.

**Table S1.** Composition of dicyclopentadiene

Composition (%)				
Oligomer	Dimer	Aliphatic hydrocarbons	Aromatic hydrocarbons	Water
81.50	13.30	4.84	0.34	0.02

**Table S2.** Chemical composition of Portland cement

Chemical composition (%)									
SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	SO <sub>3</sub>	Na <sub>2</sub> O	K <sub>2</sub> O	LOI	F-CaO
20.6	6.1	3.1	62.4	2.3	2.0	0.14	0.88	1.9	1.4

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**Table S3.** Physical properties of Portland cement

Specific gravity (g/cm <sup>3</sup> )	Stability (mm)	Setting time (min)		Compressive strength (MPa)		
		Initial	Final	3 days	7 days	28 days
3.15	0.04	220	310	24.5	30.2	40.3

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**Table S4.** Sample notation and experimental variables

Sample notation	W/C <sup>a)</sup>	P/C <sup>b)</sup>	A/C <sup>c)</sup>	Mixing time (min)	Mixing temperature (°C)
PCM	0.50	0.00	2.45	5	25
SPM5	0.50	0.05	2.45	5	55
SPM10	0.50	0.10	2.45	5	55
SPM20	0.50	0.20	2.45	5	55

<sup>a)</sup>W/C : Water to cement ratio<sup>b)</sup>P/C : Polymer to cement ratio<sup>c)</sup>A/C : Aggregation to cement ratio

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**Table S5.** The content of dehydrated calcium hydroxide of PCM and SPMs cured for 28 days

Type	Samples	Ca(OH) <sub>2</sub> (% of ignited mass)
Plain cement mortar	PCM	14.42
Sulfur polymer-cement mortar	SPM5	13.48
	SPM10	12.15
	SPM20	10.08