Supplementary file

Recent progress of coal seam water injection technology for dust prevention: A comprehensive review

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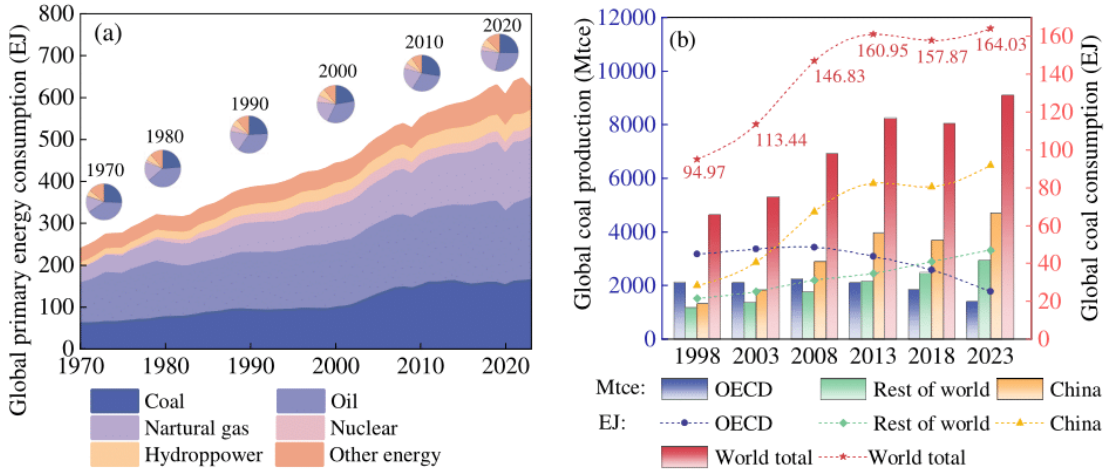

Fig. S1. (a) Proportion of global primary energy consumption and (b) proportion of coal production and consumption.

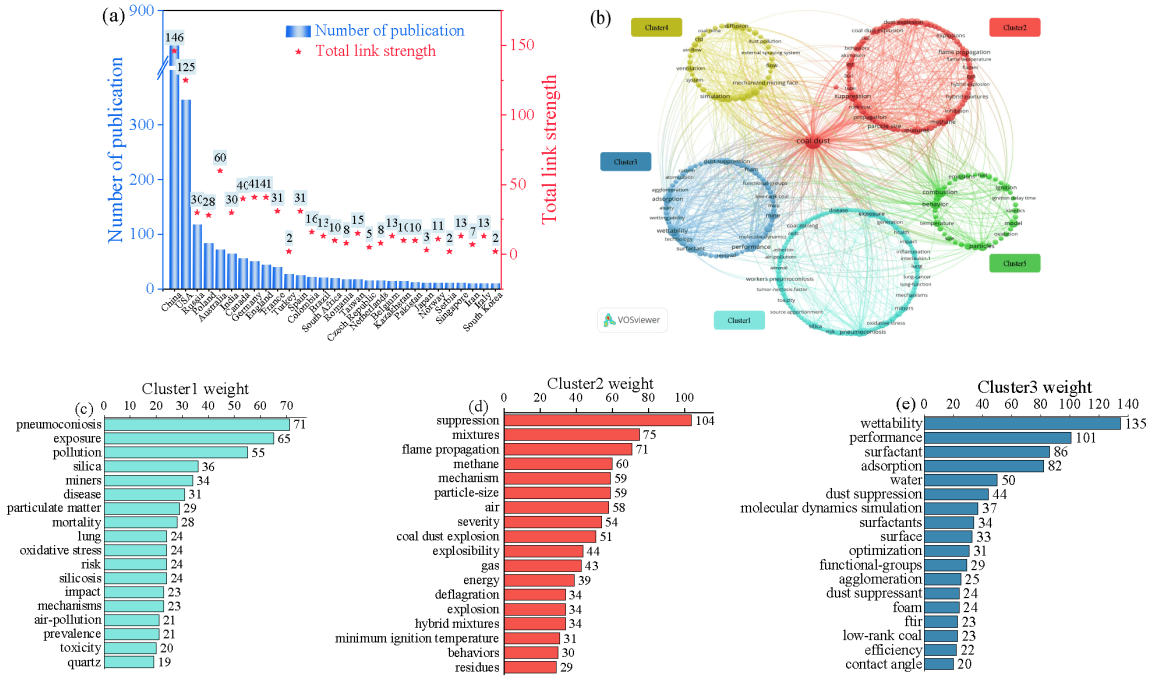

Fig. S2. VOSviewer bibliometric analysis of research with “Coal dust” as the search term: (a) Number of articles published by different countries, China (41.9%, 850 publications), the United States (17.0%, 346), and Russia (5.8%, 118). (b) keyword association map, (c) statistical analysis of keyword clustering in Cluster 1 (“pneumoconiosis”, 71 occurrences), (d) statistical analysis of keyword clustering in Cluster 2 (“suppression”, 104) and (e) statistical analysis of keyword clustering in Cluster 3 (“wettability”, 135).

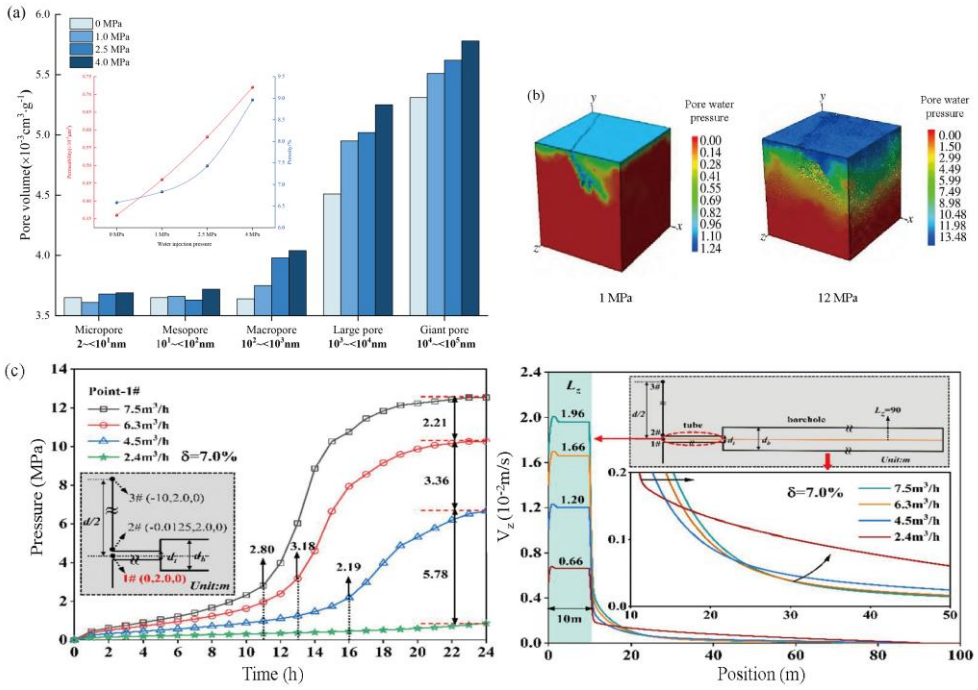

Fig. S3. Changes in pore structure and permeability characteristics during the CSWI process: (a) Variation in pore structure parameters and permeability performance of coal under low-pressure water injection conditions (Wang et al., 2018), (b) final failure conditions of coal samples under different pore water pressures (Mao et al., 2022) and (c) changes in permeation pressure and flow velocity under varying flow rates (Yan et al., 2020).

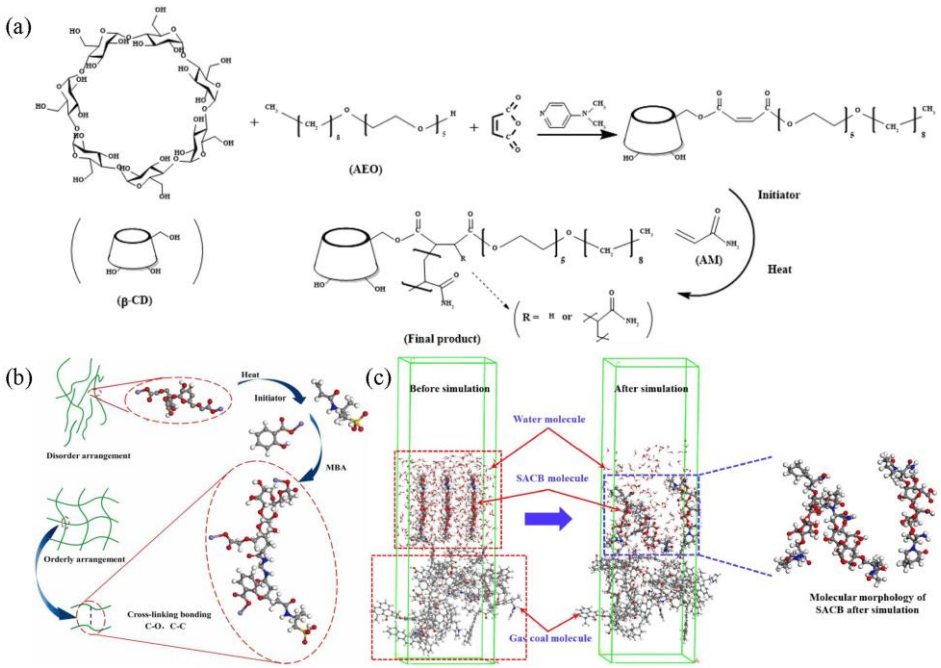

Fig. S4. Synthesis and simulation of synthetic wetting agents for CSWI: (a) Esterification reaction and free radical polymerization process (Ma et al., 2021), (b) wetting agents with

multilayer composite network structure formed by graft copolymerization (Zhou et al., 2023) and (c) dynamic simulation process of the coal-water interface (Zhang et al., 2022).

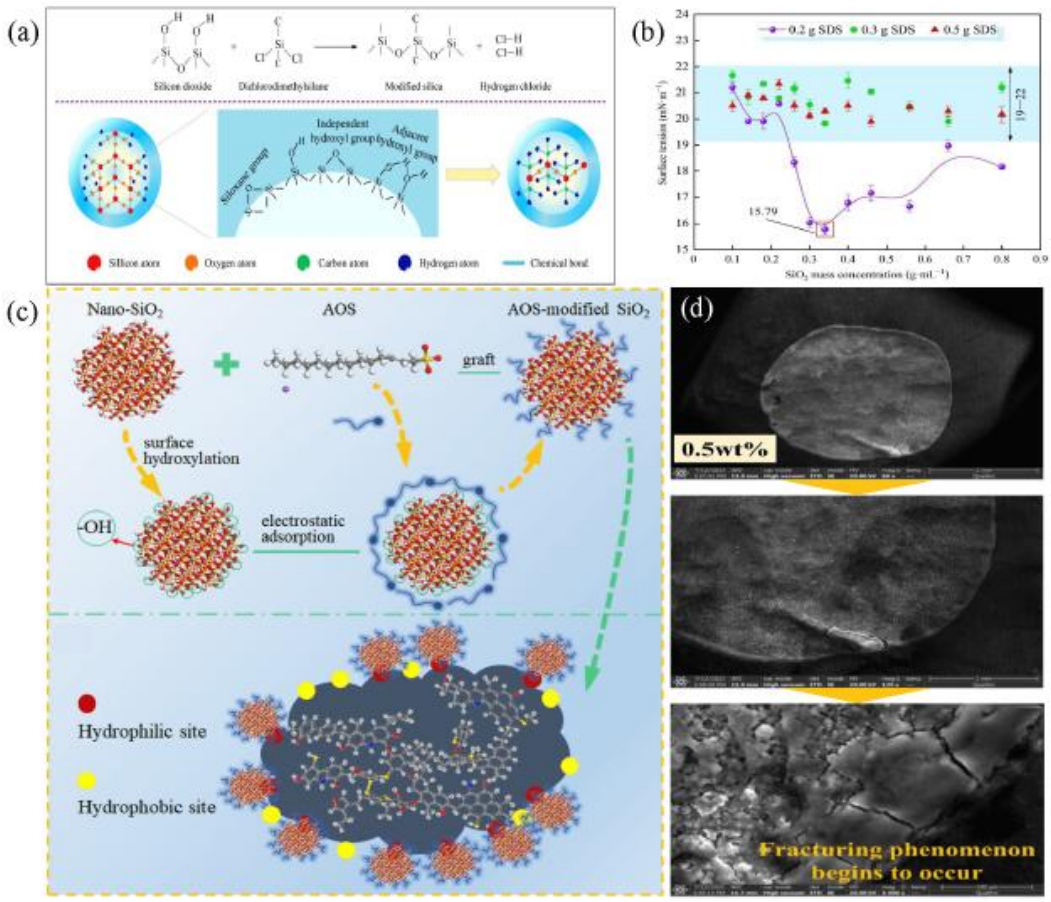

Fig. S5. Impact of SiO_2 nanofluid on coal surface modification and wettability: (a) Modification of silica nanoparticles with dichlorodimethylsilane, (b) relationship between the mass concentration of nanoparticle SiO_2 and the surface tension of nanoparticle-surfactant nanofluids (Wang et al., 2022), (c) wetting mechanism of AOS in conjunction with nanoparticle silica (Zhang et al., 2024) and (d) coffee ring structure of SiO_2 nanofluid observed under a scanning electron microscope (Zou et al., 2024).

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