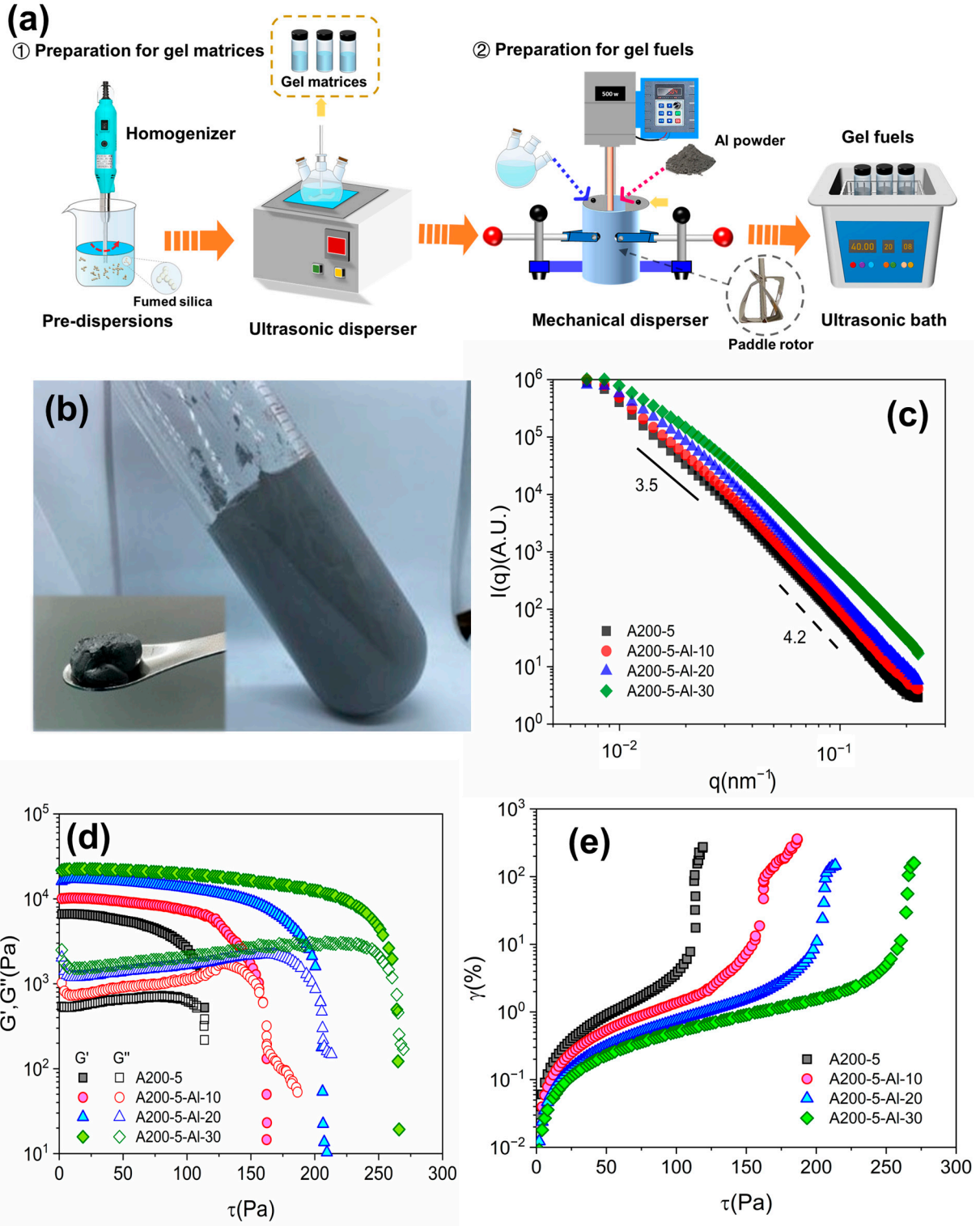
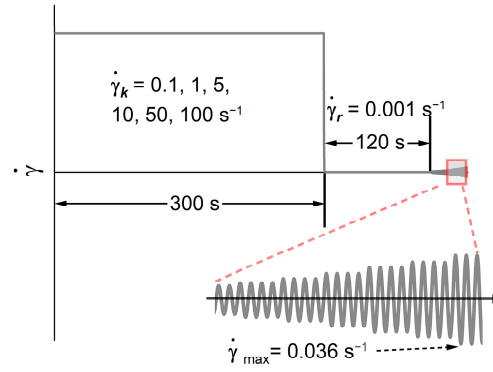


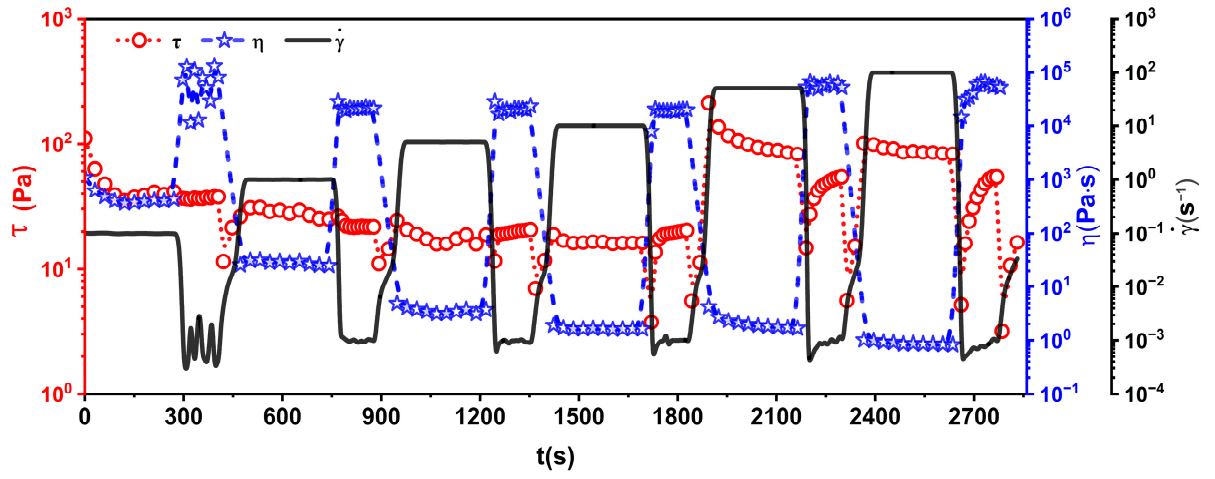
**Figure S1.** Transmission electron microscope (TEM) images of the microstructure in A200 with a primary particle diameter of 14 nm (a), (b). The primary nanoparticles are fused together into clusters with an irregular, chain-like geometry. Scanning electron microscopy (SEM) images of Al MPs with size ranging from 0.1  $\mu\text{m}$  to 3.6  $\mu\text{m}$  (c), the particle size distribution of the Al MPs (d).



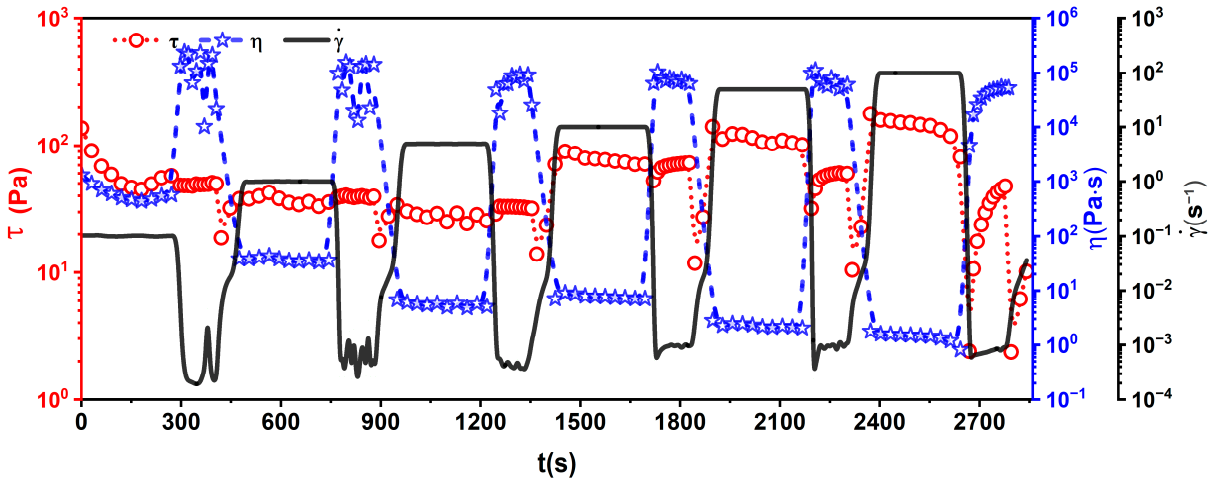
**Figure S2.** Scheme of preparing Matrigel and aluminum-containing gel fuels for experiments (a). Photographs of aluminum containing gel fuels (b). Scattering intensity ( $I$ ) and scattering vector ( $q$ ) curve via SAXS of the gel fuels (c). Stress dependence of moduli (d) and shear rate (e) for gel fuels.



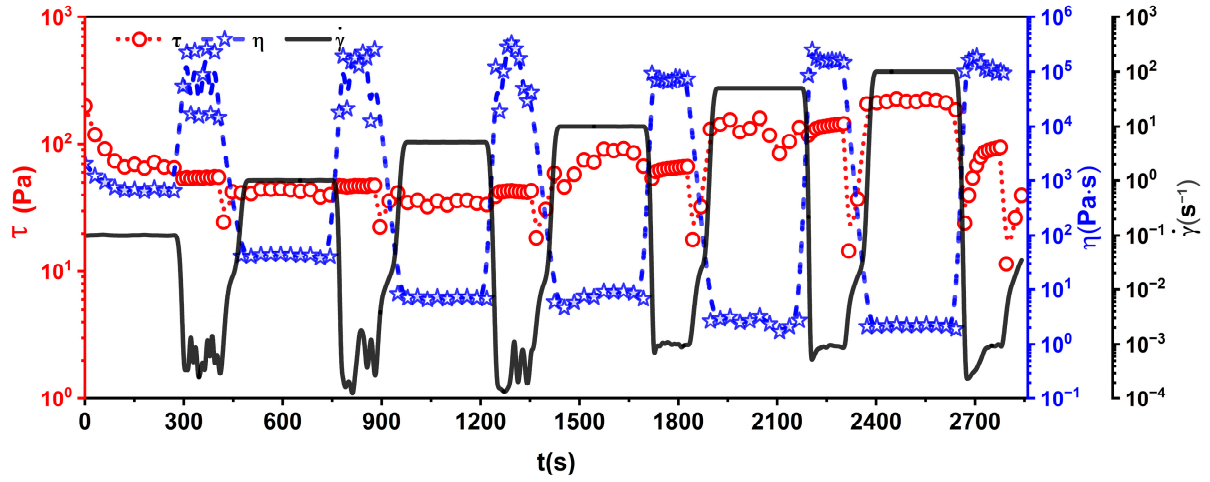
**Figure S3.** The procedure of consecutive shear changed in shear rate to obtain constant structure curve and rheological responses for gel fuels.



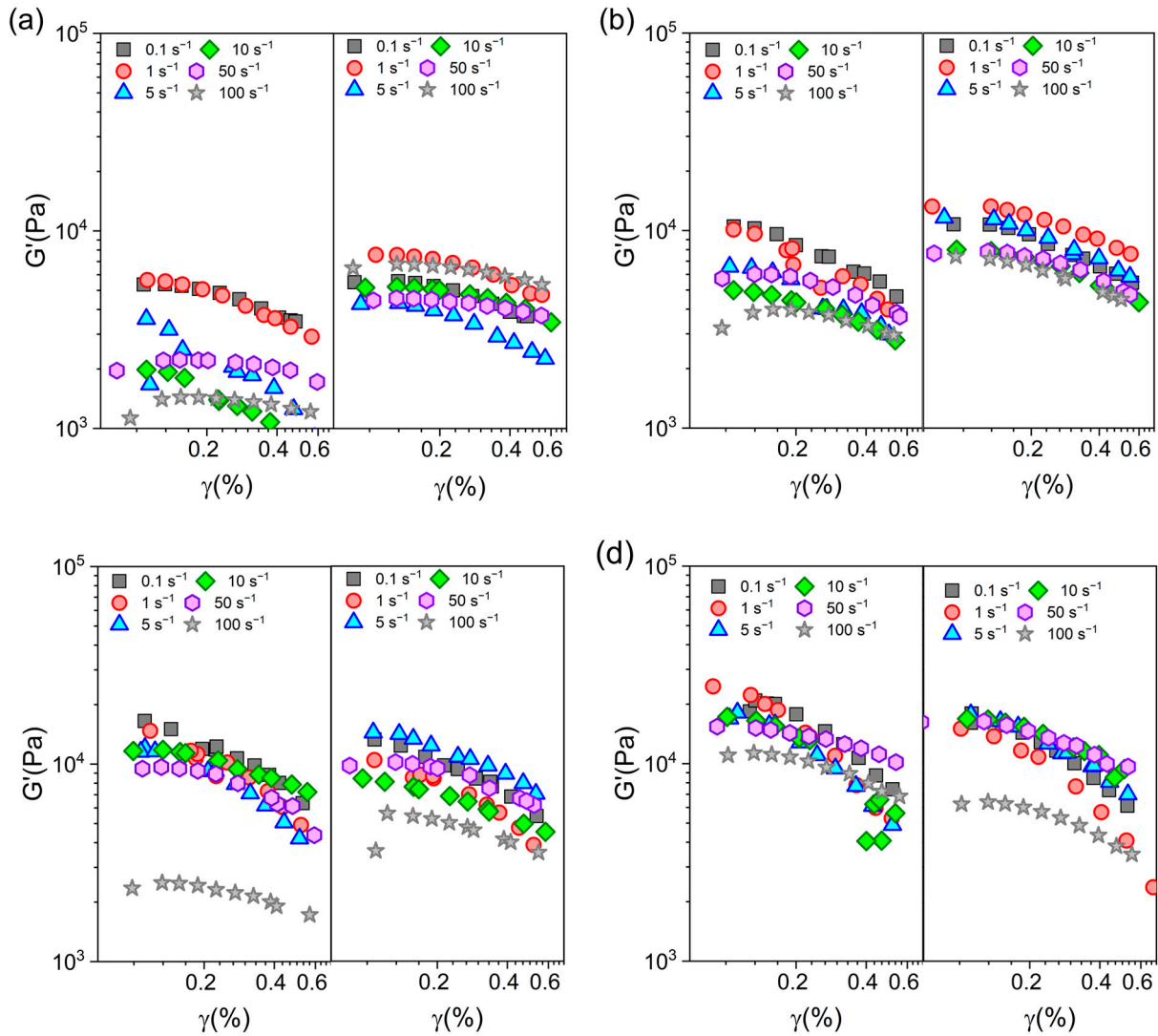
**Figure S4.** The rheological responds under applied shear procedure of A200-5-Al-10.



**Figure S5.** The rheological responds under applied shear procedure of A200-5-Al-20.



**Figure S6.** The rheological responds under applied shear procedure of A200-5-Al-30.



**Figure S7.** The elastic modulus of A200-5 (a), A200-5-Al-10 (b), A200-5-Al-20 (c) and A200-5-Al-30 (d) under the SAOS test after steady-state shearing ( $\dot{\gamma} = 0.1 \sim 100 \text{ s}^{-1}$ ) and rest shearing ( $0.001 \text{ s}^{-1}$ ) for 300s and 120s, respectively.