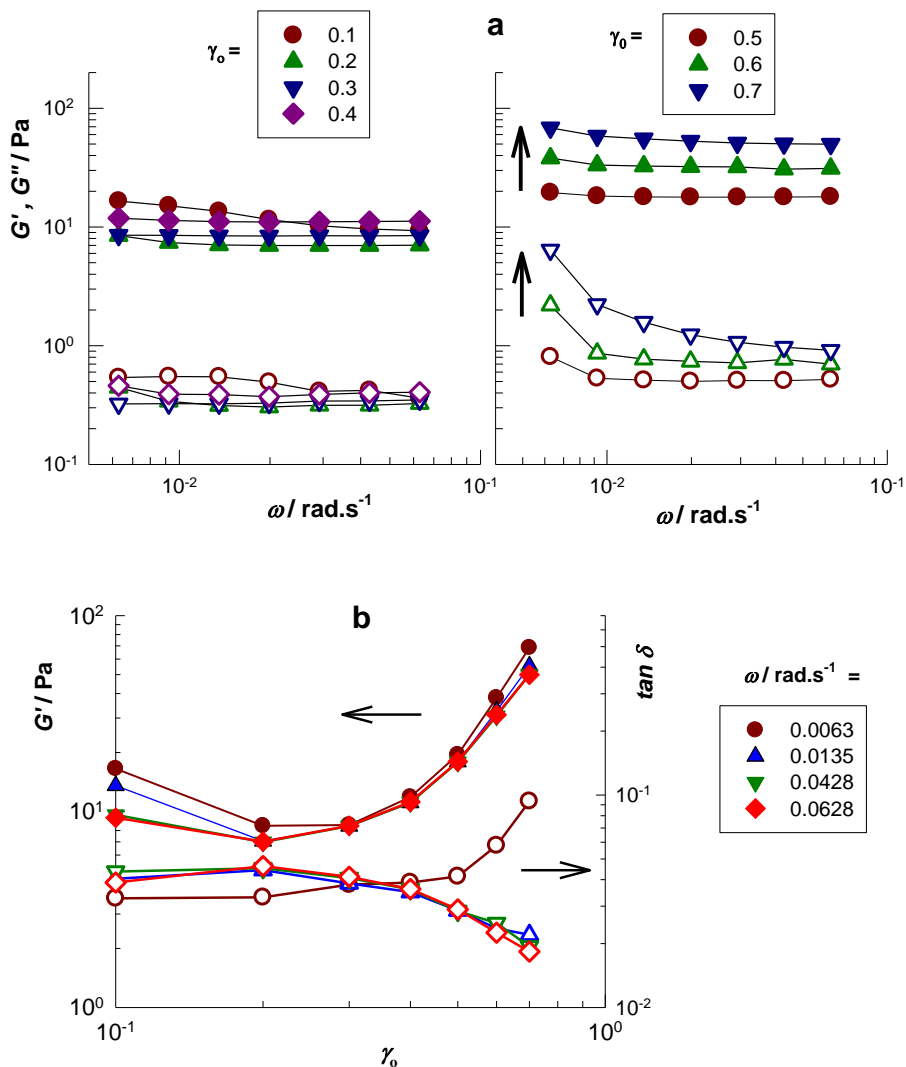**Figure S1 (a):** Storage modulus G' (filled symbols) and loss modulus G' (open symbols) of a fibroin gel with a linear modulus of 10 Pa plotted against the angular frequency ω. The arrows in the right figure indicate the direction of increasing γ_o. Temperature = 25 °C. The strain amplitudes are indicated.

(b): G' (filled symbols) and the loss factor $tan\ \delta$ (open symbols) plotted against the strain amplitude γ_o. The frequencies ω are indicated.
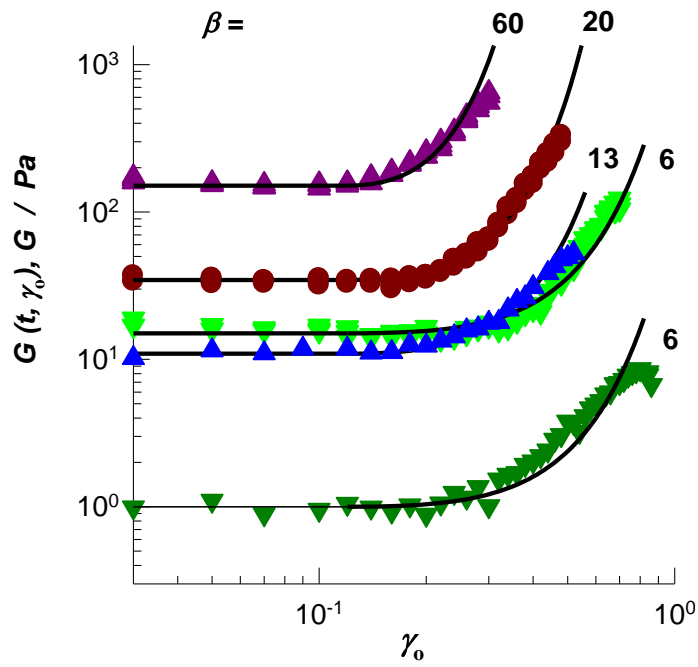
Figure S2. *G(t, γₒ)* (symbols) and the modulus *G* calculated using eqs. (4) and (5) (solid curves) of fibroin gels plotted against γ_o. The values of the parameter β are shown in the figure. Temperature = 25 °C.