Supporting Information

Bioprocess-inspired synthesis of multilayered chitosan/$CaCO_3$ composites with nacre-like structures and high mechanical properties

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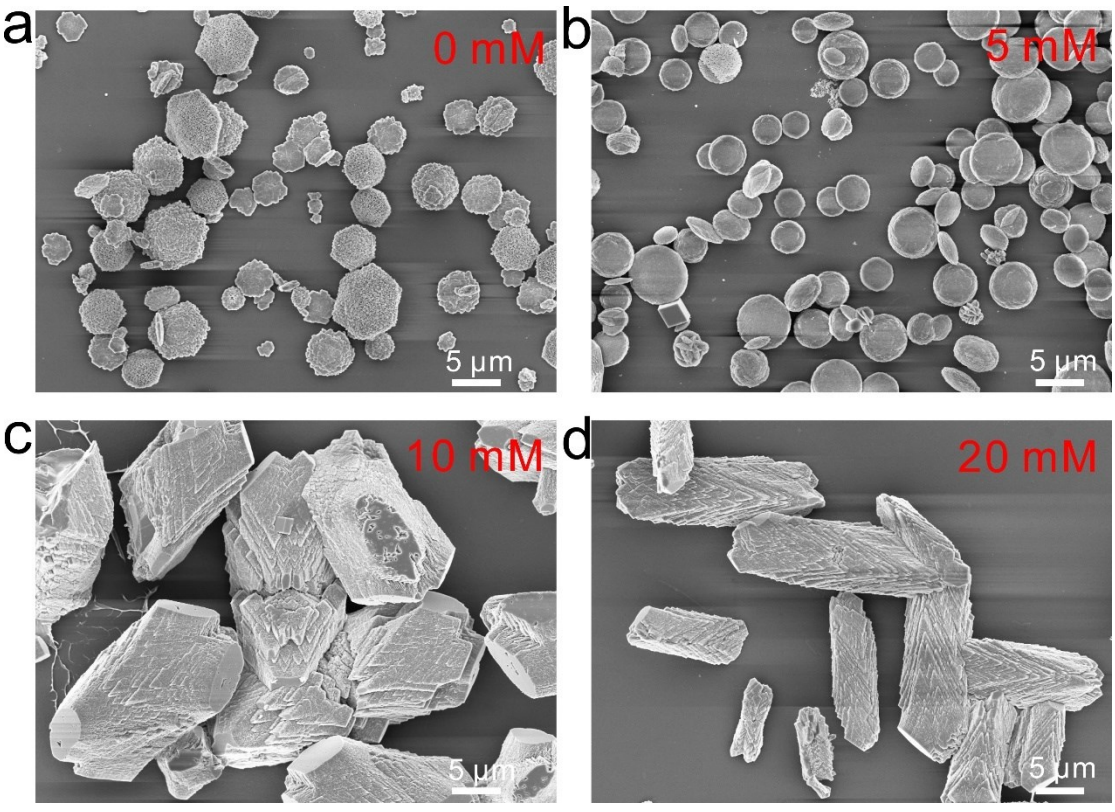

Figure S1. SEM images of $CaCO_3$ films obtained at different concentration of Mg^{2+} a) 0 mM; b) 5 mM; c) 10 mM; d) 20 mM.

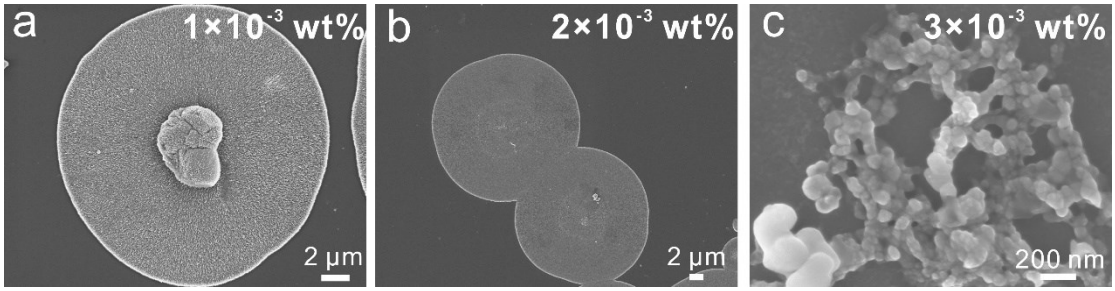

Figure S2. $CaCO_3$ films obtained at different concentrations of PAA.

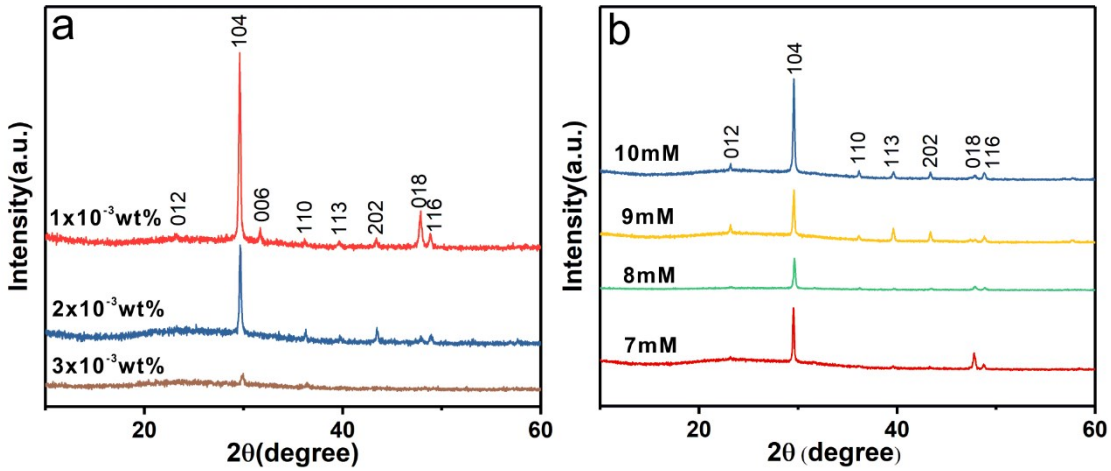

Figure S3. a) XRD patterns of $CaCO_3$ films obtained at different concentrations of PAA. b) XRD patterns of $CaCO_3$ films obtained at different concentrations of Mg^{2+} with 2◊10^{-3} wt% PAA.

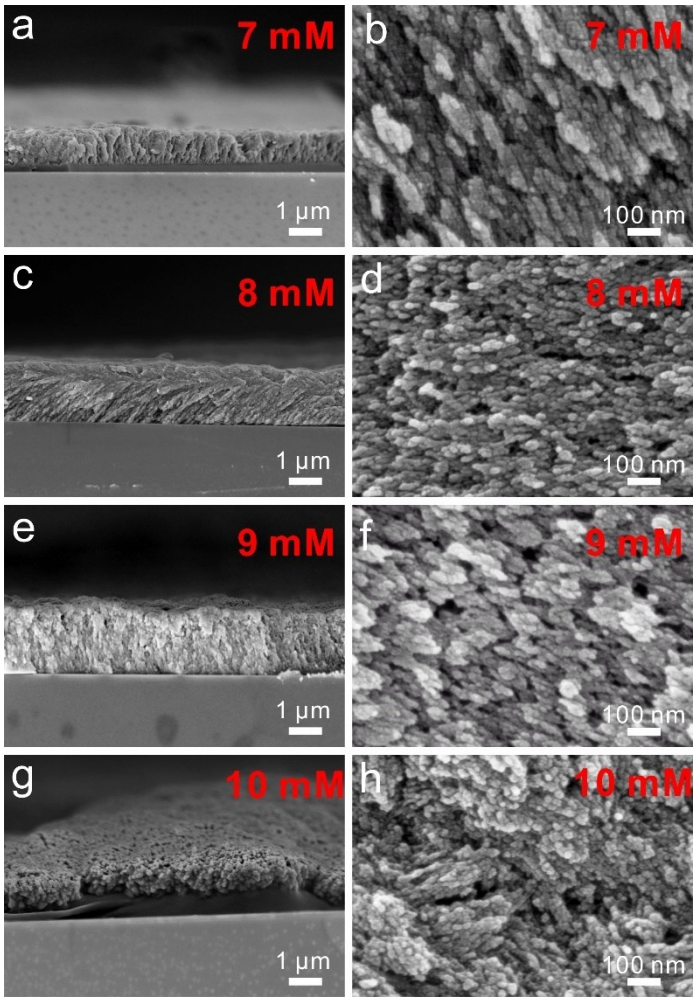

Figure S4. $CaCO_3$ films obtained at different concentrations of Mg^{2+} with $2◊10^{-3}$ wt% PAA.

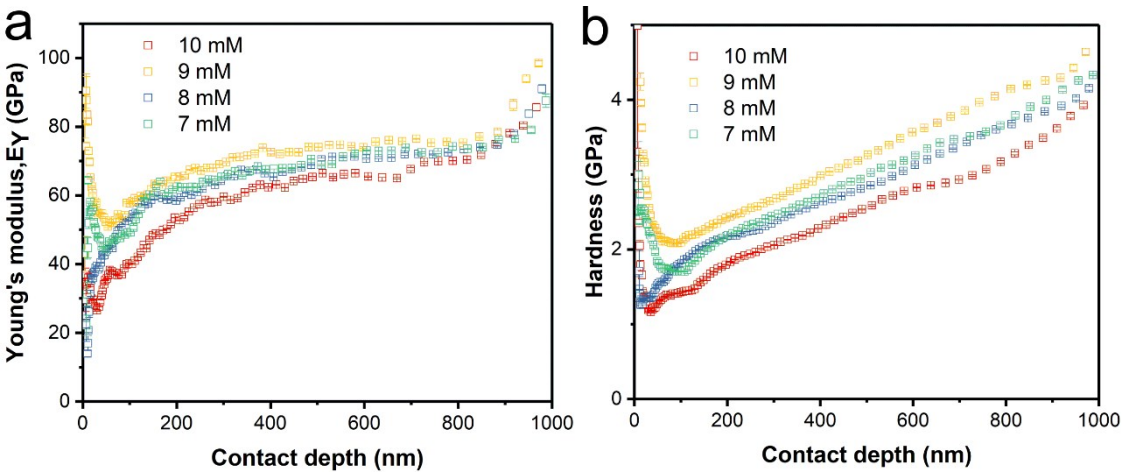

Figure S5. Mechanical properties of $CaCO_3$ films obtained at different concentrations of Mg^{2+} with 2◊10^{-3} wt% PAA. a) Young's modulus-displacement curves. b) Hardness-displacement curves.

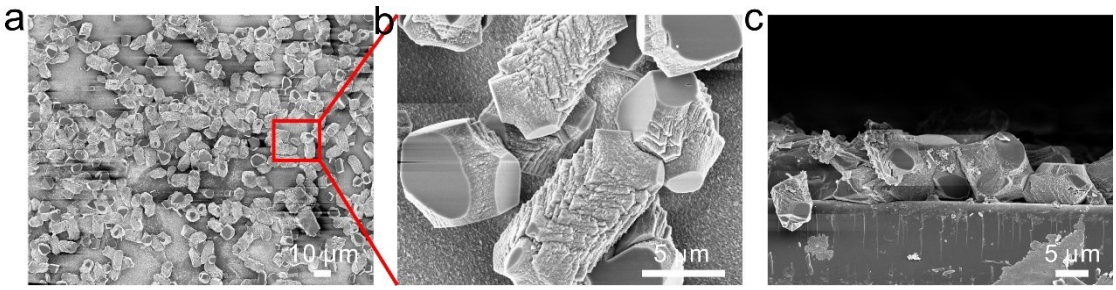

Figure S6. Scanning electron microscopy (SEM) images of mineralization directly on $(CS/CaCO_3)_1$ without spin-coating CS films.

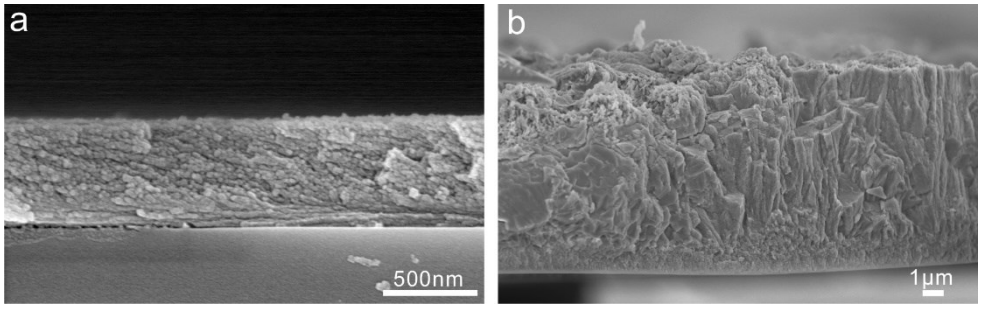

Figure S7. Mineralization at different dripping velocities. a) mineralization for 12 h at a dripping velocity of 4.16 mL h^{-1}. b) mineralization for 72 h at a dripping velocity of 0.69 mL h^{-1}.

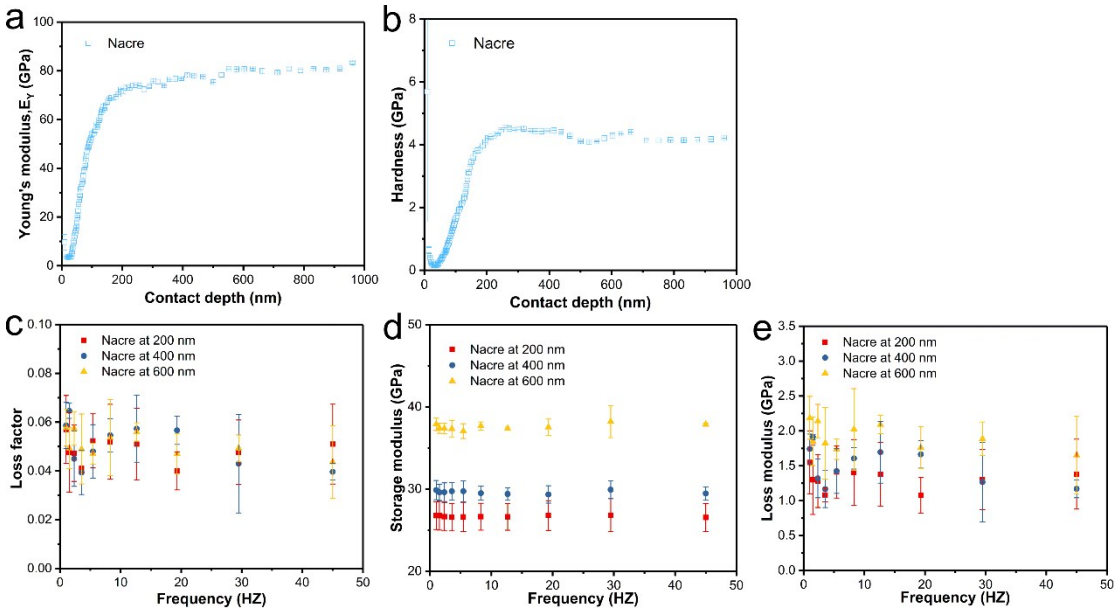

Figure S8. Mechanical properties of natural nacre tested by nanoindentation. a) Young's modulus-displacement curves. b) Hardness-displacement curves. c) Loss factor–frequency scatter plots. d) Storage modulus–frequency scatter plots. e) Loss modulus–frequency scatter plots.

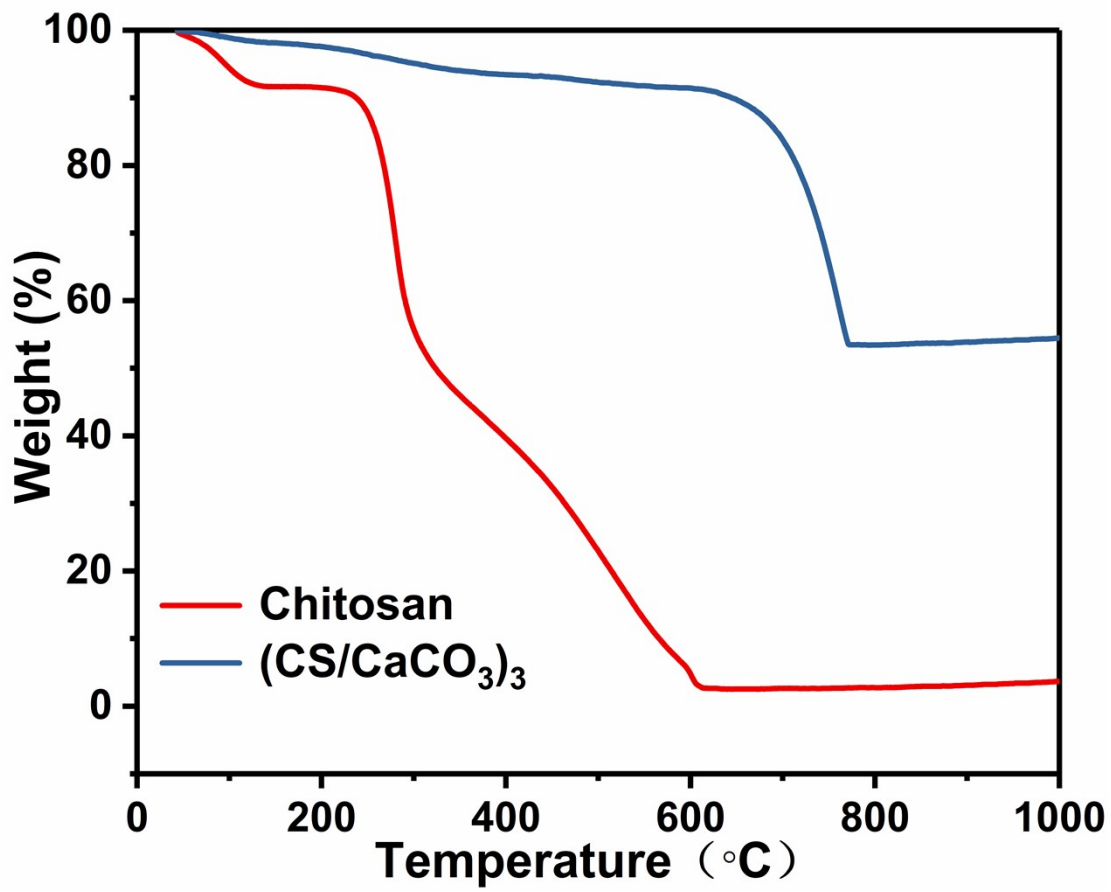

Figure S9. TGA data for the synthetic $(CS/CaCO_3)_3$ and chitosan.

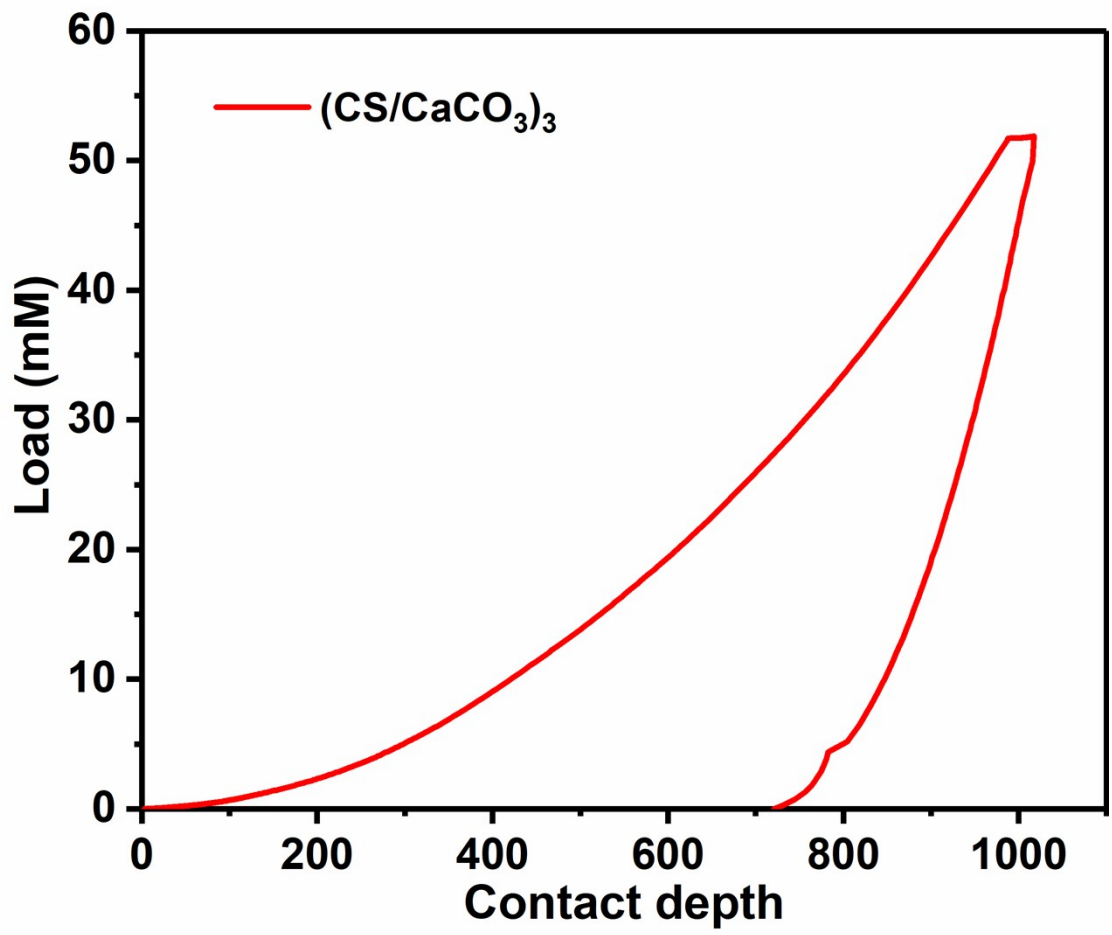

Figure S10. Load-displacement curves for $(CS/CaCO_3)_3$.