

## SUPPORTING INFORMATION

### **Effect of Poly(Acrylic Acid) on Crystallization of Calcium Carbonate in a Hydrogel**

Hong Lyun Kim<sup>†</sup>, Yu Seob Shin<sup>†</sup>, and Sung Ho Yang\*

Department of Chemistry Education, Korea National University of Education, Chungbuk 28173, Korea

<sup>†</sup>These authors contributed equally.

Phone: +82-43-230-3708

\*Email: sunghoyang@knue.ac.kr

## SUPPORTING INFORMATION

### CONTENTS

**Figure S1.** The positions of the respective regions of GEL<sub>0</sub>, GEL<sub>0.01</sub>, GEL<sub>0.1</sub> and GEL<sub>1</sub> after 12h crystallization.

**Figure S2.** XRD data of CaCO<sub>3</sub> formed in a) GEL<sub>0.01</sub>, b) GEL<sub>0.1</sub>, c) GEL<sub>1</sub> and d) pristine agarose gel.

**Figure S3.** FTIR data of CaCO<sub>3</sub> formed in a) GEL<sub>0.01</sub>, b) GEL<sub>0.1</sub> and c) GEL<sub>1</sub> .

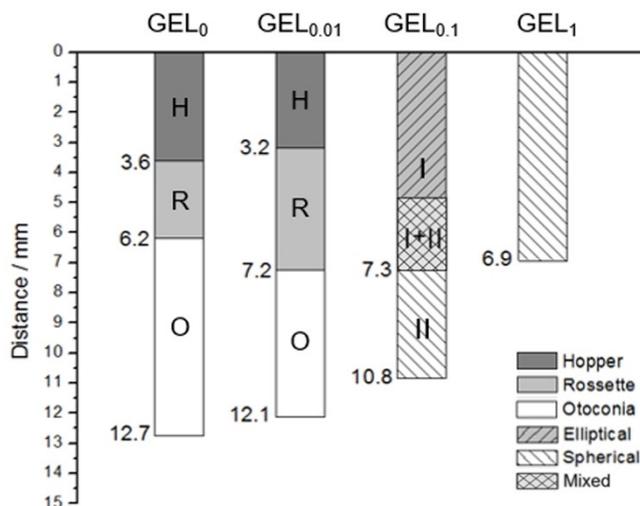
**Figure S4.** SEM micrograph of mixed region in GEL<sub>0.1</sub>.

**Figure S5.** Average size of calcite particles in GEL<sub>0.1</sub> and GEL<sub>1</sub>, which is measured by SEM micrographs.

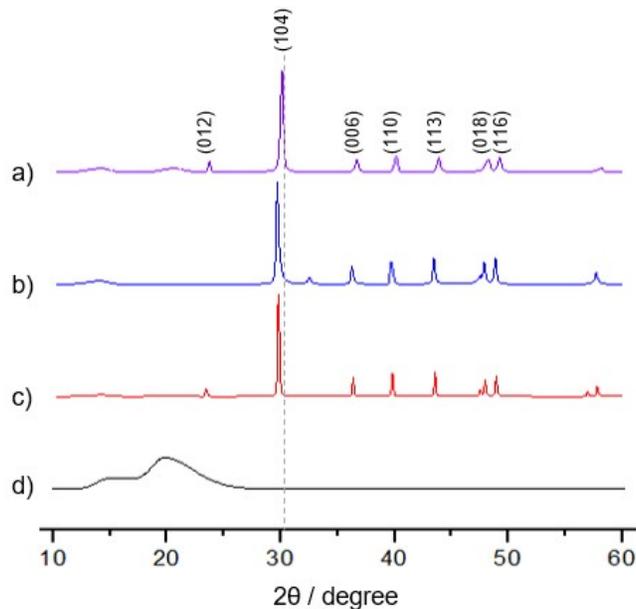
**Figure S6.** SEM micrographs of CaCO<sub>3</sub> formed after 12h in GEL<sub>0.1</sub> with different pH of Na<sub>2</sub>CO<sub>3</sub> supernatant.

**Figure S7.** SEM micrographs of CaCO<sub>3</sub> formed after 12h in hydrogels with various concentrations of PAA.

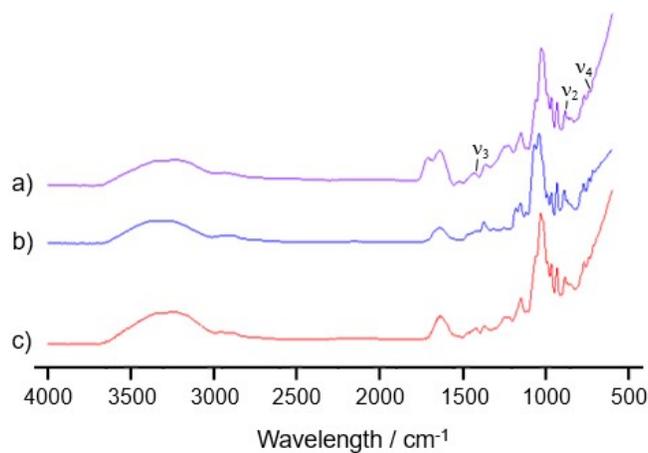
**Figure S8.** The average particle size measured by DLS as a function of pH in a free solution in the presence 0.1 (light gray) and 1 mg/mL (dark gray) PAA.



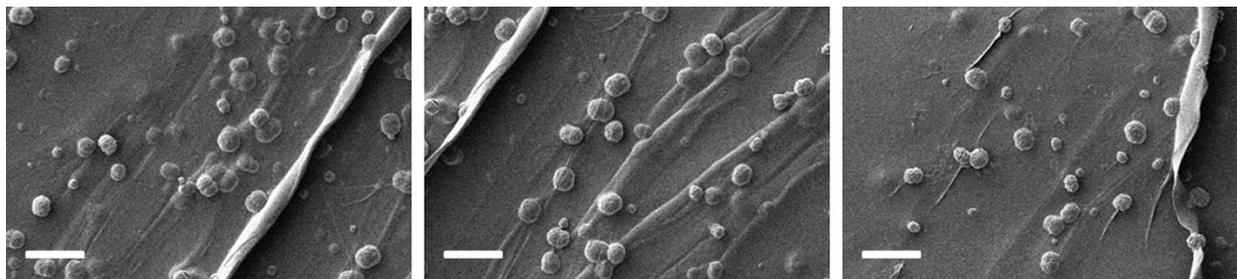
**Figure S1.** The positions of the respective regions of GEL<sub>0</sub>, GEL<sub>0.01</sub>, GEL<sub>0.1</sub> and GEL<sub>1</sub> after 12h crystallization.



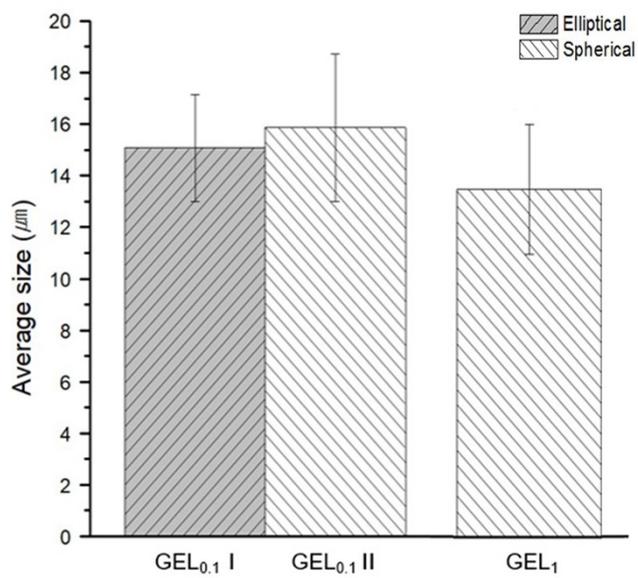
**Figure S2.** XRD data of CaCO<sub>3</sub> formed in a) GEL<sub>0.01</sub>, b) GEL<sub>0.1</sub>, c) GEL<sub>1</sub> and d) pristine agarose gel. The characteristic peaks at 29.4°, 35.9°, 39.5° were assigned as the (104), (110), and (113) facets base on reference data of calcite (JCPDF-47-1743).



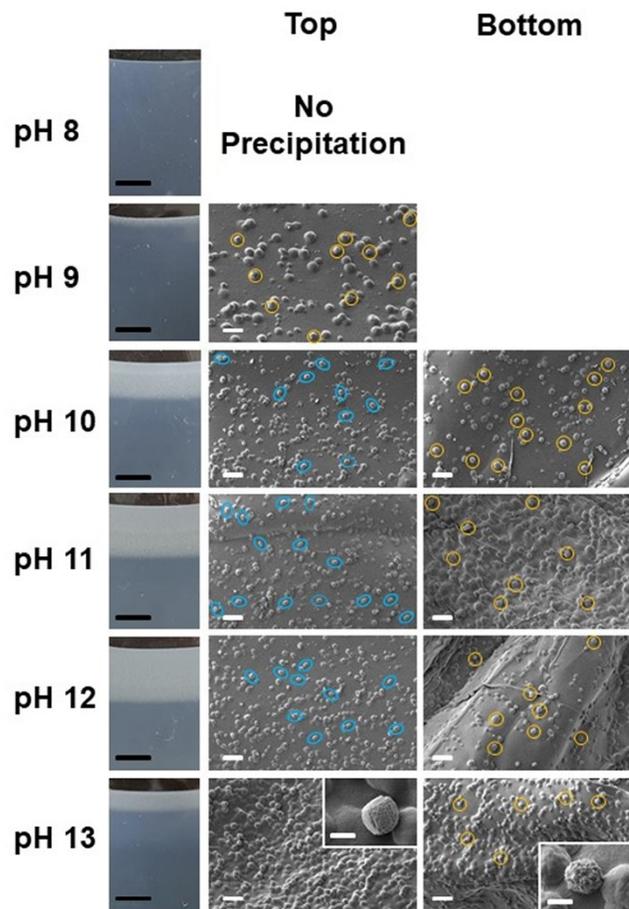
**Figure S3.** FTIR data of CaCO<sub>3</sub> formed in a) GEL<sub>0.01</sub>, b) GEL<sub>0.1</sub> and c) GEL<sub>1</sub>. Main peaks for calcite were found at ~1420 cm<sup>-1</sup>, ~880 cm<sup>-1</sup>, and ~710 cm<sup>-1</sup> in all samples, which were assigned as v<sub>3</sub>(in-plane asymmetric stretching), v<sub>2</sub>(out-of-plane bending) and v<sub>4</sub>(in-plane bending) mode, respectively (S. Gunasekaran, G. Anbalagan and S. Pandi, J. Raman Spectra., 2006, **37**, 892-899).



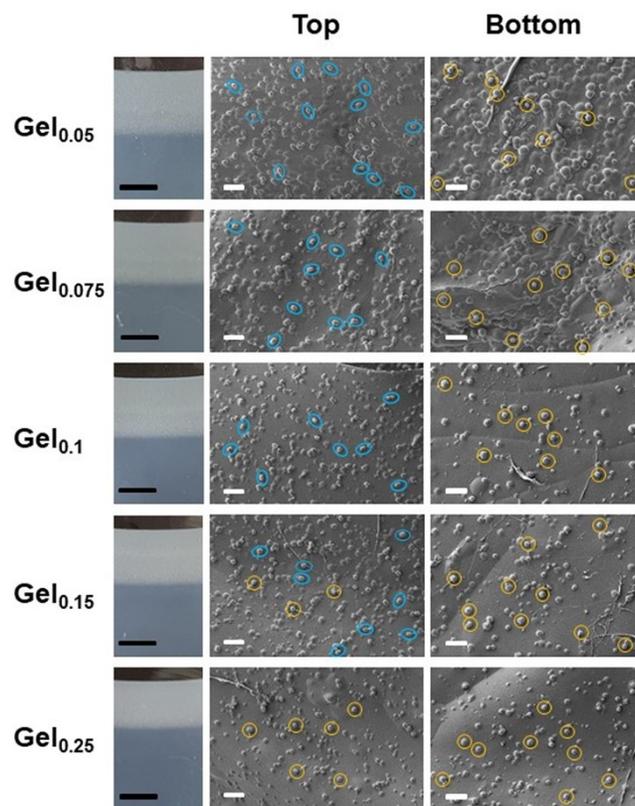
**Figure S4.** SEM micrograph of mixed region in GEL<sub>0.1</sub>. Scale bar is 50 μm.



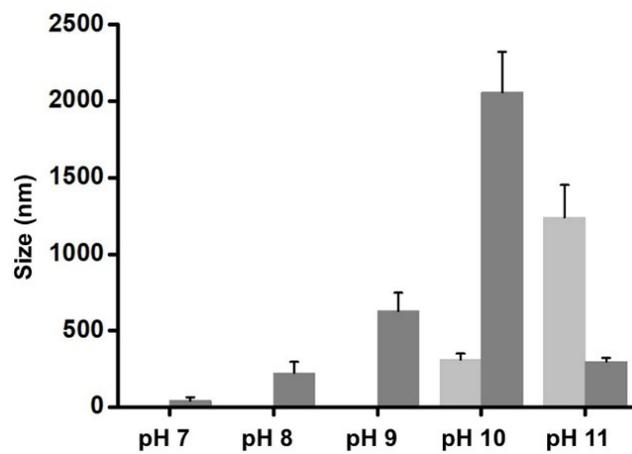
**Figure S5.** Average size of calcite particles in GEL<sub>0.1</sub> and GEL<sub>1</sub>, which is measured from SEM micrographs.



**Figure S6.** SEM micrographs of  $\text{CaCO}_3$  formed after 12h in  $\text{GEL}_{0.1}$  with different pH of  $\text{Na}_2\text{CO}_3$  reservoir. The blue oval and orange circle indicate elliptical calcite and spherical calcite, respectively. Black scale bar is 5 mm and white one is 50  $\mu\text{m}$ .



**Figure S7.** SEM micrographs of CaCO<sub>3</sub> formed after 12h in hydrogels with various concentrations of PAA. The blue oval and orange circle indicate elliptical calcite and spherical calcite respectively. Black scale bar is 5 mm and white one is 50 μm.



**Figure S8.** The average particle size measured by DLS as a function of pH in a free solution in the presence 0.1 (light gray) and 1 mg/mL (dark gray) PAA. The concentration of  $\text{Ca}^{2+}$  is 10 mM.