

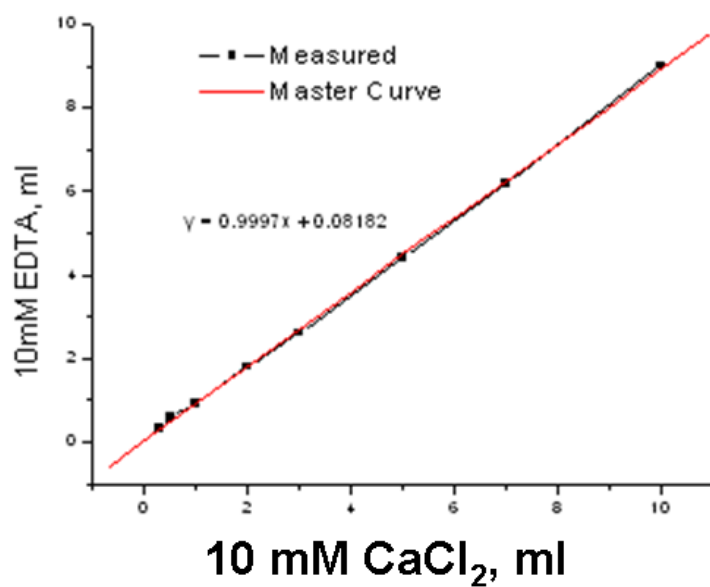
# CaCO<sub>3</sub> precipitation and polymorphs forms during CO<sub>2</sub> sequestration from the atmosphere: Effects of the basic buffer components.

Shichoon Lee<sup>1</sup>, Dong Hun Sin<sup>2</sup>, Kilwon Cho<sup>2\*</sup>

<sup>1</sup>Department of Materials Science and Engineering, Jungwon University, Goesan 367-805, Republic of Korea

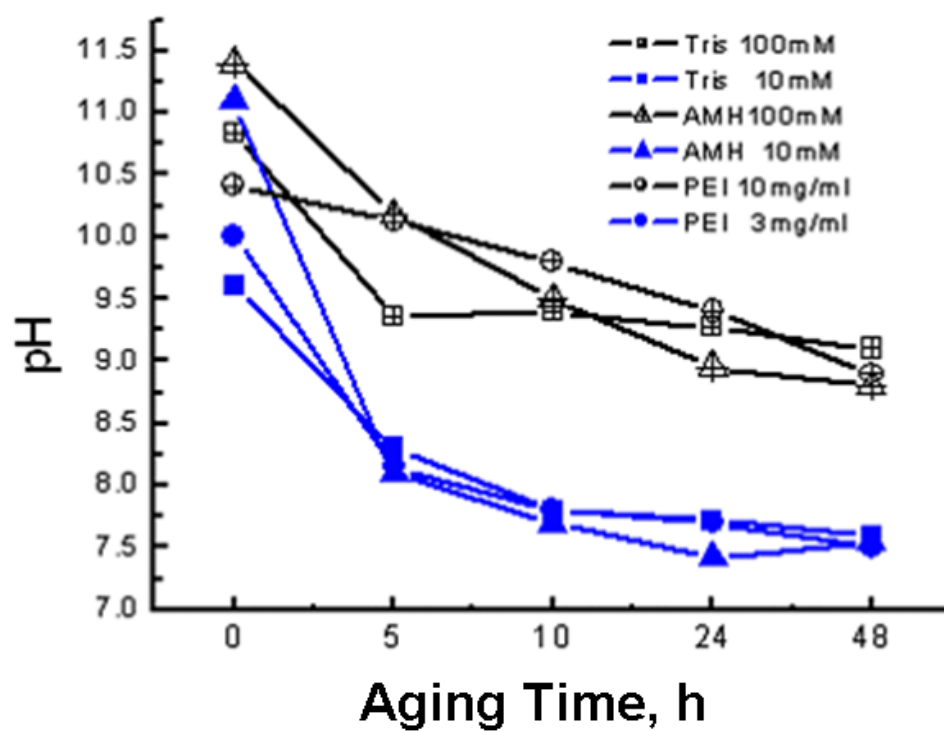
<sup>2</sup>Department of Chemical Engineering, Pohang University of Science and Technology,  
Pohang 790-784, Republic of Korea, Tel: 82-54-279-2270. E-mail: kwcho@postech.ac.kr

Supplementary Figure 1. The amount of consumed calcium ions was measured by using master curve with ethylenediaminetetraacetic acid (EDTA) titration method.



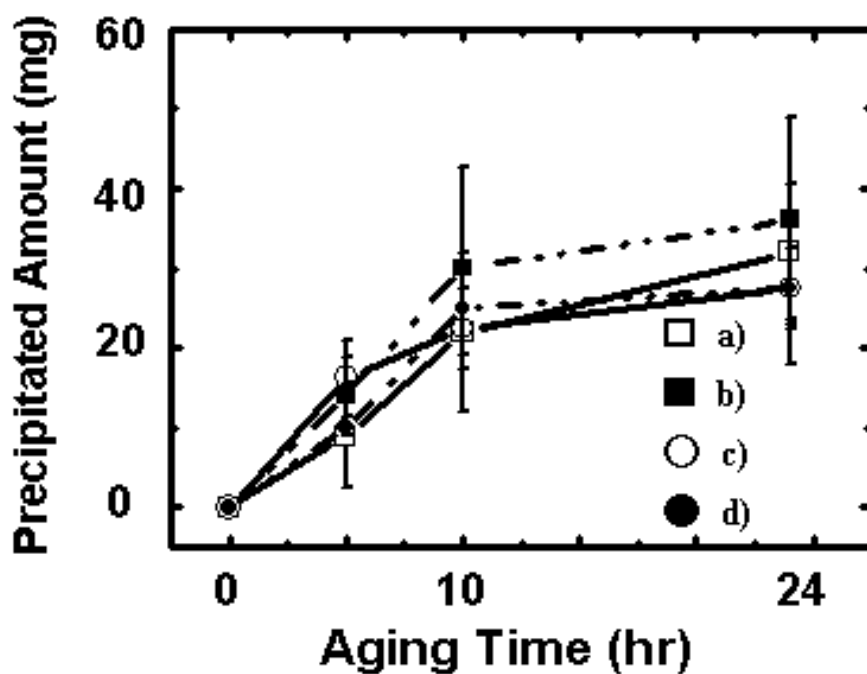
**Supplementary Figure 1**

Supplementary Figure 2. The solution pH change at varying concentrations of basic buffers with aging time.



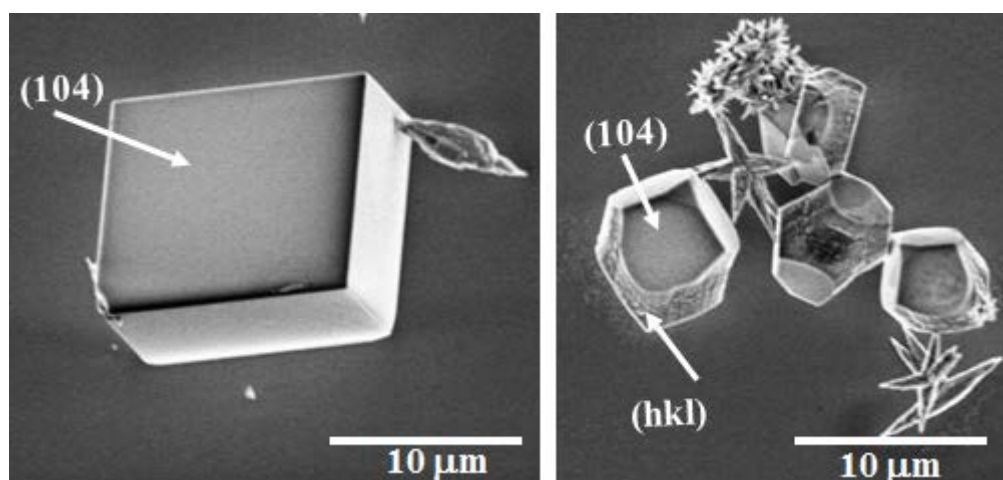
**Supplementary Figure 2.**

Supplementary Figure 3. Amounts of precipitated  $\text{CaCO}_3$  by the aging of calcium ions in solution and  $\text{CO}_2$  from the air at different aging times and basic buffers. Each precipitated amount was the average of four tests. a) 100 mM Tris, b) 10  $\mu\text{g/ml}$  CA/100 mM Tris, c) 100 mM AMH , and d) 10  $\mu\text{g/ml}$  CA/ 100 mM AMH buffer.



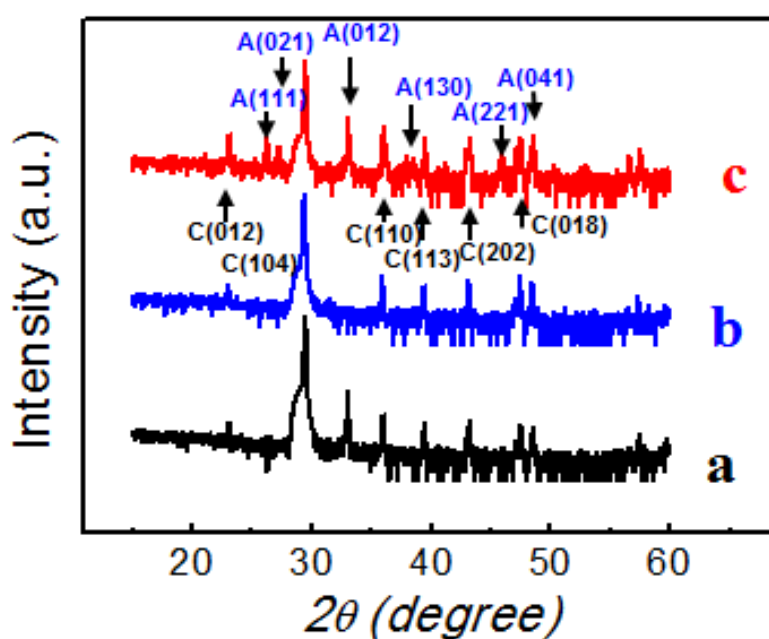
**Supplementary Figure 3.**

Supplementary Figure 4. a) Synthetic rhombohedral calcite crystals in the AMH buffer. The crystals grew only (104) plane, and b) Synthetic calcite crystals grown in the PEI buffer showed the development of new crystal face (hkl).



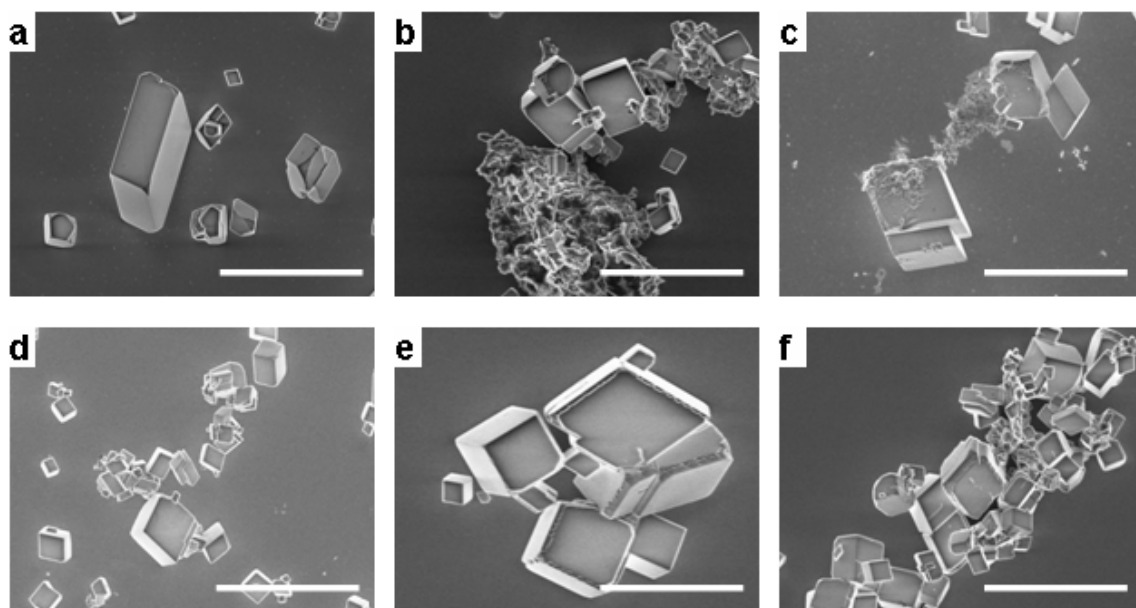
**Supplementary Figure 4.**

Supplementary Figure 5. The XRD patterns collected from the precipitates after 24 h aging times. The patterns were similar but more notable for calcite bands to those collected from the corresponding precipitates after 10 h. a) Tris buffer, b) AMH buffer, c) PEI buffer



**Supplementary Figure 5.**

Supplementary Figure 6. Scanning electron microscope photographs showing  $\text{CaCO}_3$  crystals deposited after 10 h of aging time at low concentration of basic buffers. a) 3 mM Tris, b) 10  $\mu\text{g/ml}$  of CA/ 3 mM Tris, c) 3 mM AMH, d) 10  $\mu\text{g/ml}$  of CA/ 3 mM AMH, e) 0.3 mg/ml PEI, and f) 10  $\mu\text{g/ml}$  CA/ 0.3 mg/ml PEI buffer.



**Supplementary Figure 6.**