## Supporting Information: Enhancing the yield of calcium carbonate precipitation by obstacles in laminar flow in confined geometry

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2

3

## Contents

1 II	njection	Valve	
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2 Gel-embedded Precipitation Pattern

## **1** Injection Valve

To avoid premature precipitation in the injection system and to facilitate bubble-free filling of the reactor, a 4-way valve was designed and constructed; see the schematics and the realization in Fig. 1a and b, respectively. The reference state is the clean and dry tubing and cell gap (Fig. 1a1). The cell gap is then filled with the CaCl<sub>2</sub> solution (Fig. 1a2). Once the injection is stopped, the mobile piston cleans the inlet while pushed down (Fig. 1a3). The valve is rotated in the next step by  $180^{\circ}$  and is cleaned by injecting first water (Fig. 1a4) then air (Fig. 1a5). The valve is filled with Na<sub>2</sub>CO<sub>3</sub> solution (Fig. 1a6) and is rotated by 90° to align with the mobile position (Fig. 1a7). Finally, the piston is pulled up while the Na<sub>2</sub>CO<sub>3</sub> solution is injected (Fig. 1a8). The system is now ready to start the experiment by pulling up the piston to reach again the position in Fig. 1a1 and by starting the injection of the Na<sub>2</sub>CO<sub>3</sub> solution.



Figure 1: The schematics (a) and the realization (b) of the 4-way valve and its filling procedure to avoid air bubbles and premature precipitation.

## 2 Gel-embedded Precipitation Pattern

To avoid any damage caused to the horizontally grown precipitate pattern upon tilting it vertically, the pattern is conserved in a slightly cross-linked hydrogel matrix obtained via *in situ* photoinduced polymerization. The successful gel-embedding is illustrated in Fig. 2. It is also proved that the gel ingredients do not interfere with the precipitation reaction, since the microstructure of the particles stayed unchanged independently of the their presence or absence as shown in Fig. 3. Rhombohedral, most probably calcite polymorphs of CaCO<sub>3</sub> are found in the well-stirred reference system, i.e., upon mixing the reactants in a beaker. The reactant concentrations are identical with that used for the flow-driven experiments (1 M for both the CaCl<sub>2</sub> and Na<sub>2</sub>CO<sub>3</sub> solutions) but no gel ingredient has been added. Not only the incorporation of the gel ingredients in the reactant solutions, but also applying beads in the Hele-Shaw cell did not modify the product (Fig. 3b and c).



Figure 2: Gel-embedded precipitate pattern in horizontal (a) and vertical (b) positions. Bead size: d = 5 mm.



Figure 3: SEM images of the CaCO<sub>3</sub> precipitate produced in well-stirred (a) and flow-driven systems with (b) and without (c) applying beads in the Hele–Shaw cell.