

## **Supplementary File**

### **Preparation and properties of starch-cellulose composite aerogel**

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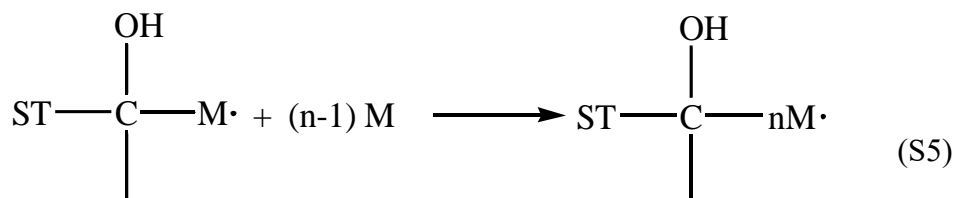
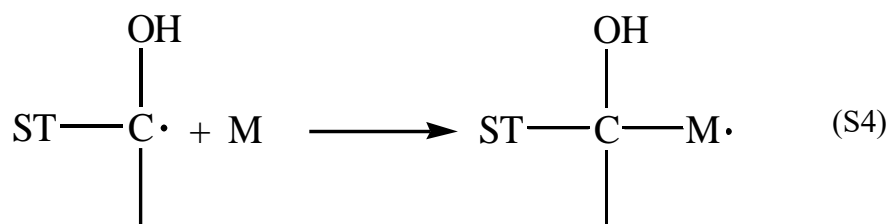
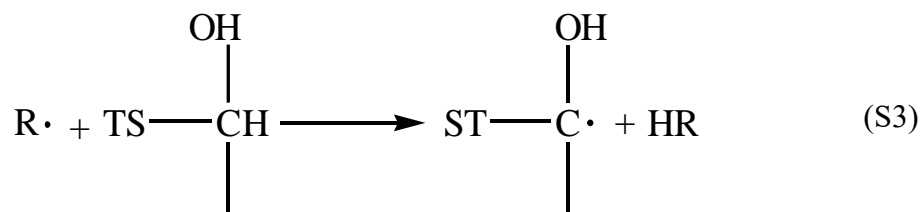
## Synthesis mechanism of cross-linking starch by MBA

(1) The initiator decomposes to generate free radicals:



The radicals  $\text{SO}_4^{\cdot-}$ ,  $\text{HSO}_3^{\cdot}$  and  $\text{OH}^{\cdot}$  are all denoted as  $\text{R}^{\cdot}$ .

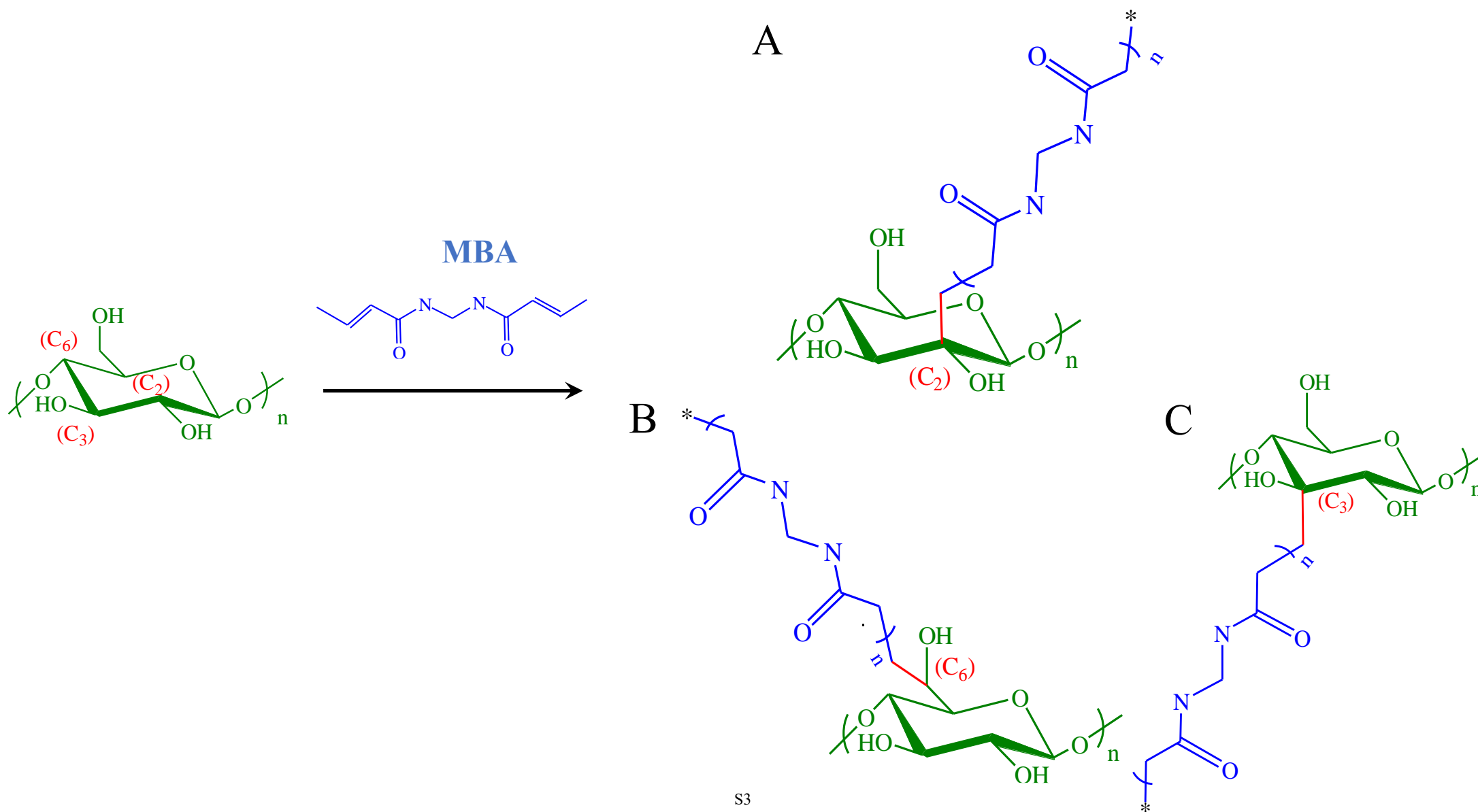
(2) Copolymerization of MBA and Starch:



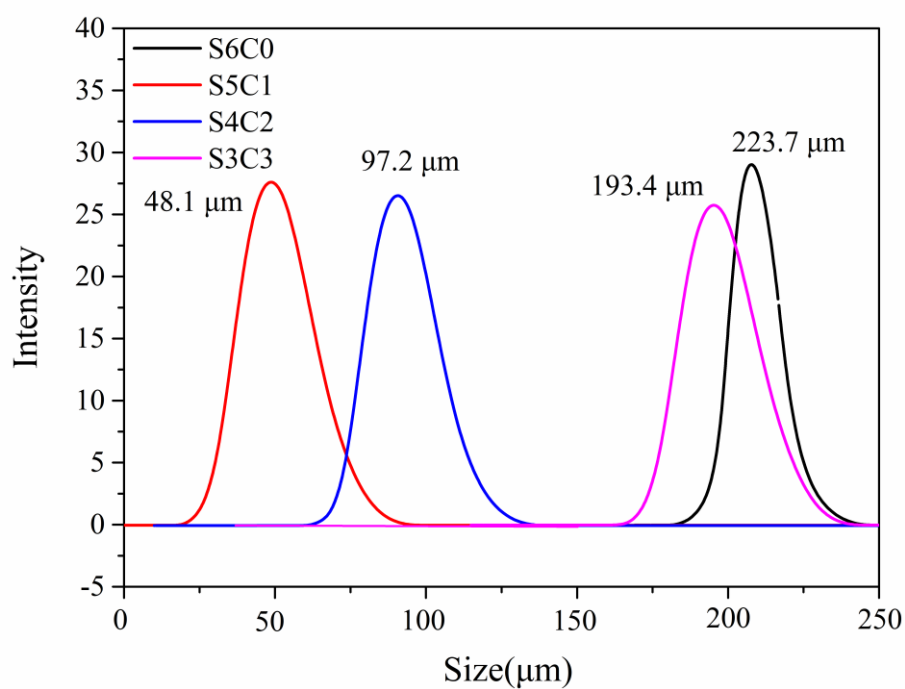
Chain termination  
 $\longrightarrow$  Copolymer

where M represents MBA monomer,  $\text{ST} - \overset{\text{OH}}{\underset{|}{\text{CH}}}$  is the starch molecule.

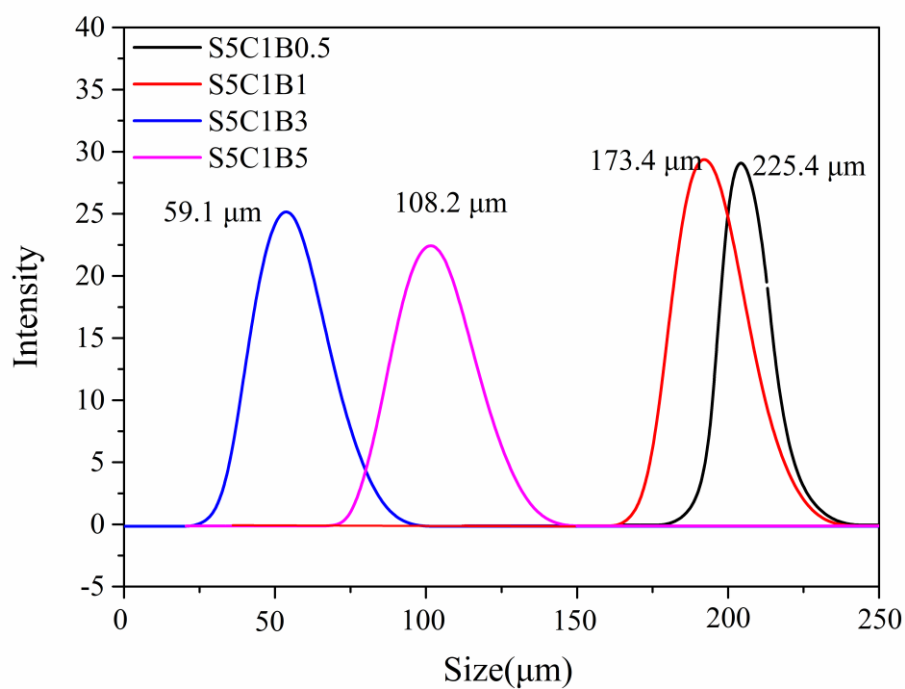
**Note:** According to our previous study, the C<sub>2</sub>, C<sub>3</sub> and C<sub>6</sub> in the anhydroglucose were all involved in the copolymerization. Meanwhile, since there are two unstable double bonds in the MBA molecule, it has higher copolymerization reactivity. The possible structure of the copolymers formed by starch and MBA are shown as follows:



**Figure S1.** Schematic diagram of the copolymers formed by starch and MBA at (A) C<sub>2</sub>, (B) C<sub>3</sub> and (C) C<sub>6</sub> in the anhydroglucose



**Figure S2** size distribution of S6C0, S5C1 aerogel, S4C2 aerogel and S3C3 aerogel



**Figure S3** size distribution of S5C1B0.5 aerogel, S5C1B1 aerogel, S5C1B3 aerogel, and S5C1B5 aerogel