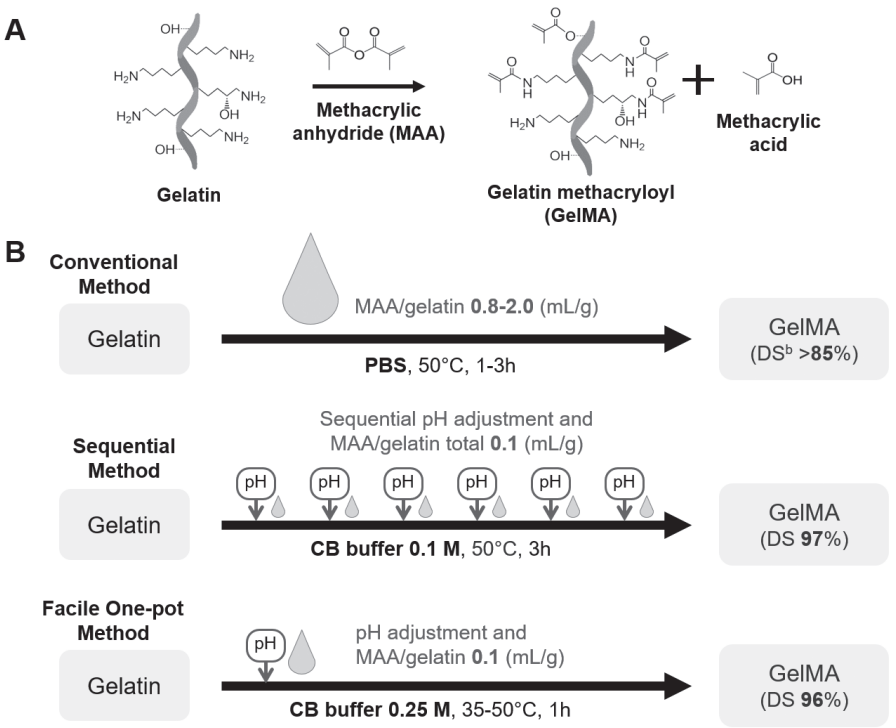

Fig. 8. One-pot synthesis of Gelatin methacryloyl (A) Synthesis scheme of gelatin methacryloyl. (B) Comparison of different methods of gelatin methacryloyl synthesis. Adopted from (Shirahama et al. 2016).

propyl carbodiimide, hydrochloride)/NHS(N-hydroxysuccinimide) conjugation method (Dong et al. 2005). In this reaction, the carboxylic groups of collagen were activated by EDC/NHS in10 mM HCl at 4ºC and then were conjugated with AHC. Also the reaction of gelatin with thymine could produce UV crosslinkable gelatin (Chung and Matsuda 1998).

In addition to UV light curing, photocurable gelatin hydrogels have been also explored in visible light curing methods for developing surgical tissue adhesives. As for visible light curing, xanthene dyes (fluorescein, eosin Y, and rose bengal)-derivatized gelatins or styrene-derivatized gelatin with carboxylated camphorquinone were used (Li et al. 2003; Nakayama and Matsuda 1998). The preparation of photocurable gelatin with vinyl groups was as follows: gelatin was dissolved in PBS at 60ºC, and 4-vinylbenzoic acid was dissolved in 1 M sodium hydroxide, separately. Two solutions were then mixed in the presence of EDC for half an hour at 0ºC, followed by continuous overnight stirring at room temperature. Photocurable styrene-derivatized gelatin and dye-derivatized gelatins were cured by visible light wave lengths between 400 and 600 nm. Additional PEGDA was utilized to reinforce the mechanical stiffness of the gelatin-based hydrogels, which could serve as a tissue adhesive glue for vascular surgery and endoscopic surgery.