A facile one-step synthesis to ionic liquids-based cross-linked polymeric nanoparticle and its

## application for CO<sub>2</sub> fixation

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Figure S1. <sup>1</sup>H NMR spectrum of 4-vinylbenzyl-tributylphosphorous chloride



Figure S2. <sup>13</sup>C NMR spectrum of 4-vinylbenzyl-tributylphosphorous chloride



Figure S3. Photographs of cross-linked polymer emulsions in different solvents. a) absolute methanol; b) methanol; c) absolute ethanol; d) ethanol; e) absolute isopropanol; f) isopropanol.



Figure S4. Photographs of cross-linked polymer emulsions with different molar ratio of EGMA to PIL



Figure S5 Photographs of cyclocaddition reaction mixture. (a) just after the reaction; (b) after toluene was added.



Figure S6

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Figure S7



Figure S8



Figure S9



Figure S10



Figure S11 SEM and TEM images of used CLPN.