Electronic Supplementary Material (ESI) for Nanoscale.

Quantified Instant Conjugation of Peptides on a Nanogold Surface for Tunable Ice Recrystallization Inhibition

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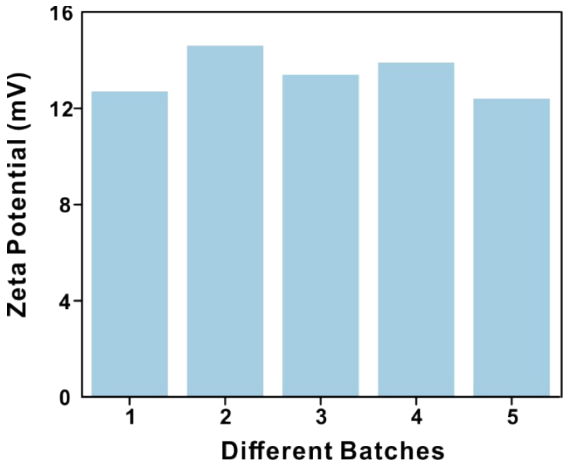

Figure S1. The Zeta potential of different batches of peptide consist of seven threonine and modified with thiol (cysteine) at the carboxyl-terminal. (n=5).

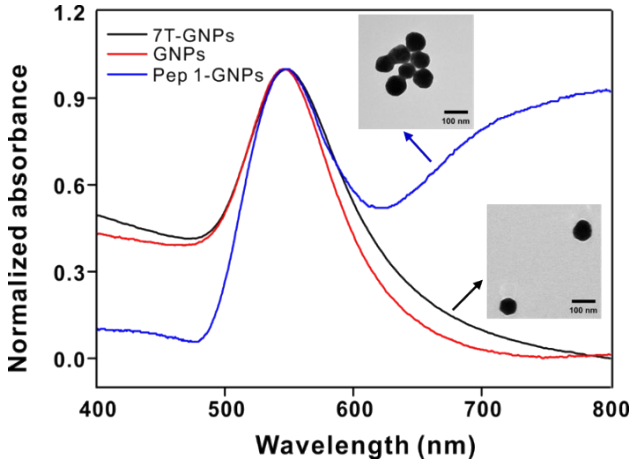

Figure S2. Quantification of 2T and 7T attached in GNPs over time by using a fluorescence quantification kit.

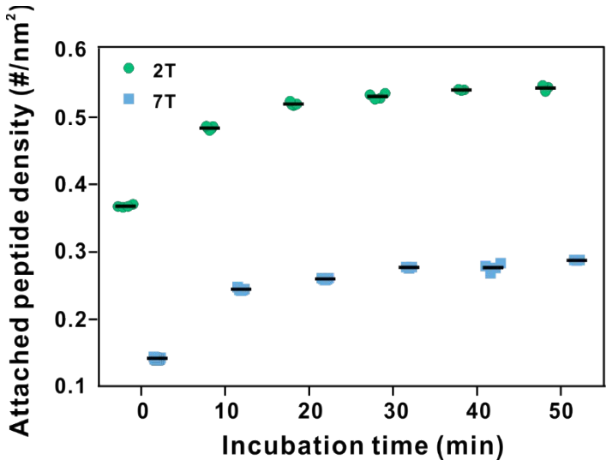

Figure S3. Quantification of 2T and 7T attached in GNPs over time by using a fluorescence quantification kit. The short peptide on the GNPs had basically reached the equilibrium of reaction after incubation for 30 min. Each time node was determined by measuring three parallel samples.

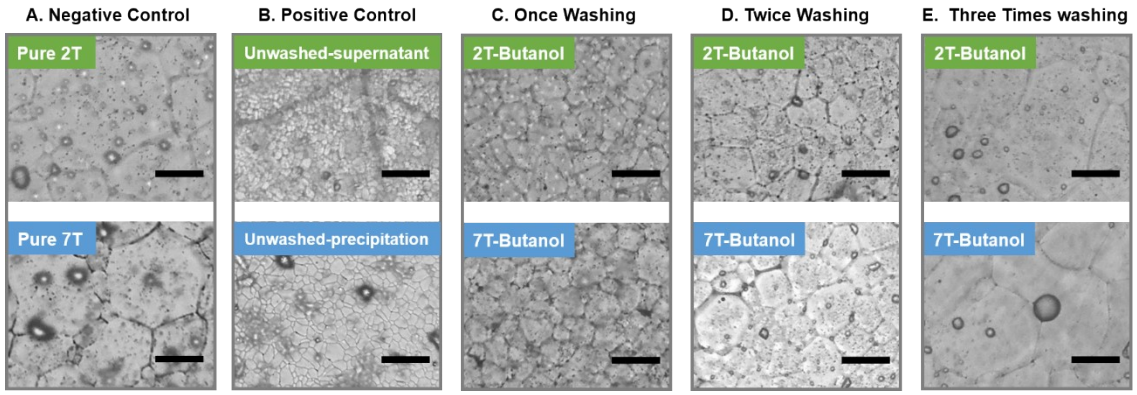

Figure S4. Ice recrystallization inhibition activity of control and supernatant of peptide-GNP conjugates washed after different times at - 8 °C for 30 min. Each data was determined by measuring three parallel samples. Scale bar = 100 μm. (A). In the negative control, the mean largest grain size (MLGS) of pure 2T was 186 μm, pure 7T was 183 μm. (B). In the positive control, the mean largest grain size (MLGS) of unwashed supernatant of 2T-GNP conjugated by butanol dehydration was less than 10 μm, and the unwashed precipitation (0.2 nM) in the same sample was 23 μm. (C). The MLGS of supernatant of 2T-Butanol and 7T-Butanol after once washing were 56 μm and 53 μm, respectively. (D). The MLGS of supernatant of 2T-Butanol and 7T-Butanol after twice washing were 115 μm and 123 μm, respectively. (E). The MLGS of supernatant of 2T-Butanol and 7T-Butanol after three times washing were 184 μm and 180 μm, respectively.

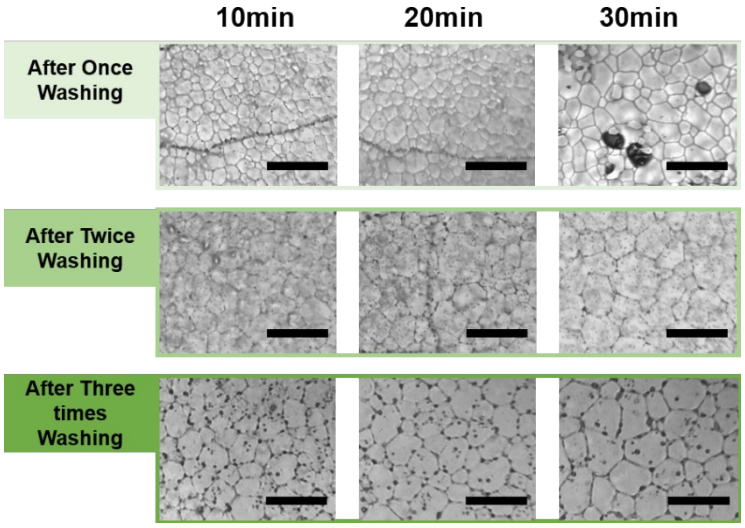

Figure S5. Microscopic images of ice crystals annealed at - 8 °C for 10, 20 and 30 min for precipitation of 2T-Butanol washed after different times. The concentration of the conjugates was 0.2 nM. All experiments were conducted in 10 mM NaCl. Scale bar = 100 µm.

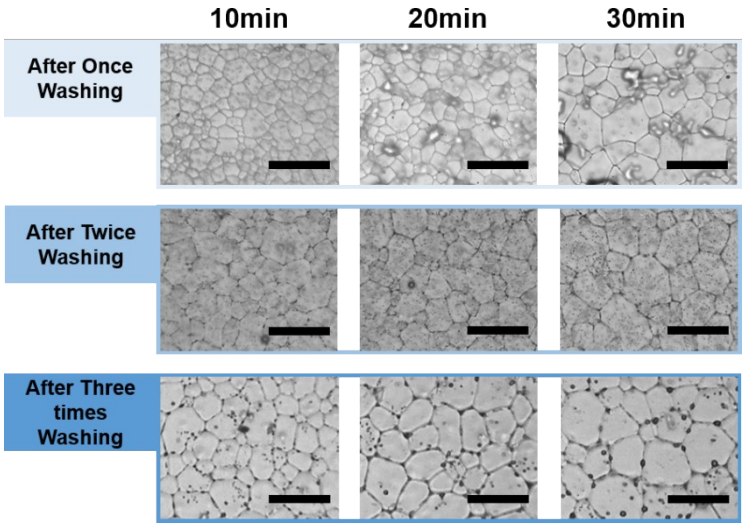

Figure S6. Microscopic images of ice crystals annealed at - 8 °C for 10, 20 and 30 min for precipitation of 7T-Butanol washed after different times. The concentration of the conjugates was 0.2 nM. All experiments were conducted in 10 mM NaCl. Scale bar = 100 µm.

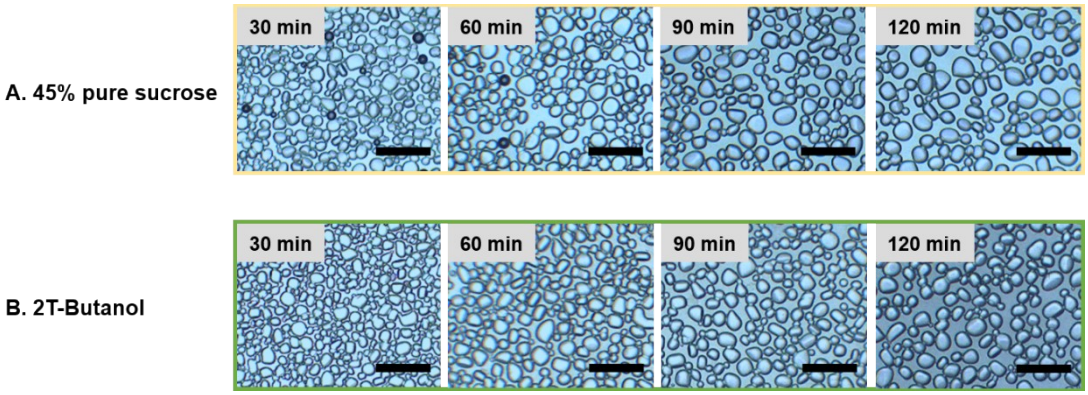

Figure S7. Sucrose-assisted ice recrystallization inhibition activity analysis of (A) 45% pure sucrose and (B) 2T-Butanol in different times. The concentration of the conjugates was 0.2 nM. Scale bar = 100 μm.

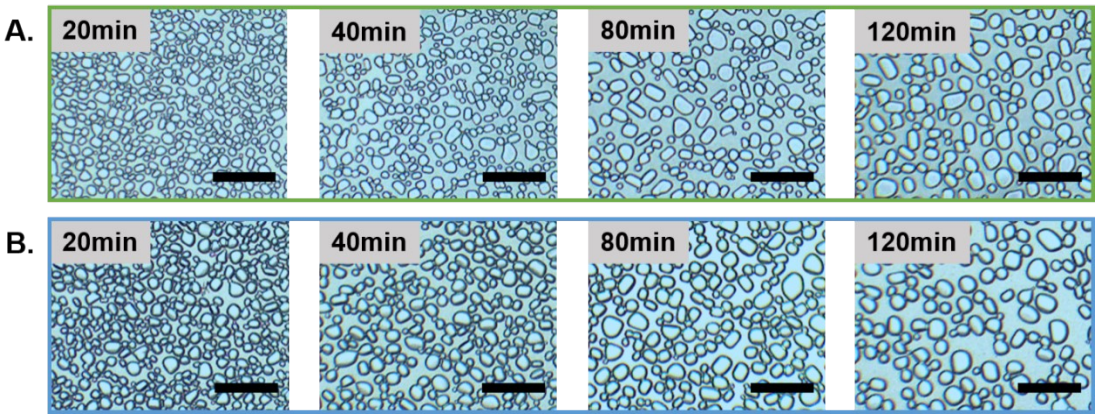

Figure S8. Sucrose-assisted ice recrystallization inhibition activity analysis of (A) 2T-GNP and (B) 7T-GNP within 20-120 min. The attached density of peptide on GNP were 0.2/nm^2. The final concentration of conjugates was all 0.2 nM after mixed with 45% sucrose. Scale bar = 100 μm.

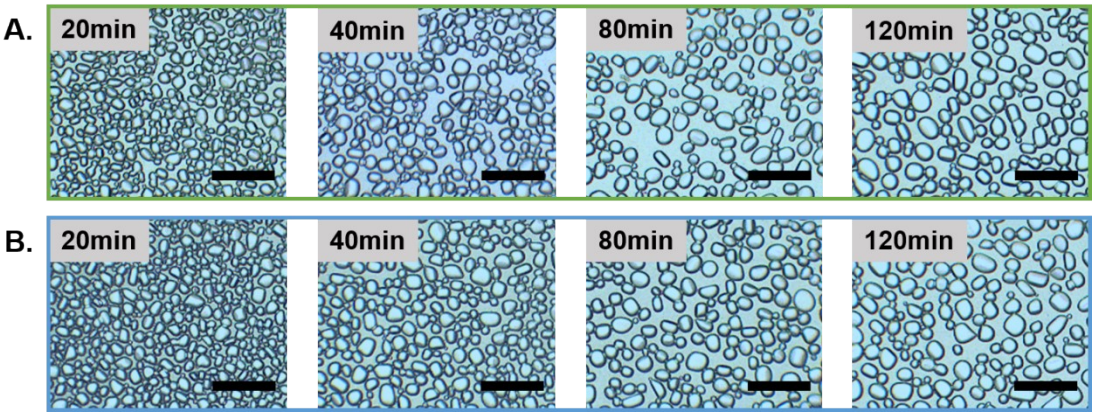

Figure S9. Sucrose-assisted ice recrystallization inhibition activity analysis of (A) 2T-GNP and (B) 7T-GNP within 20-120 min. The attached density of peptide on GNP were 0.3/nm^2. The final concentration of conjugates was all 0.2 nM after mixed with 45% sucrose. Scale bar = 100 μm.