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Electronic Supplementary Information

Effects of Proton Irradiation on Si-Nanocrystal/SiO_2 Multilayers: Study of Photoluminescence and First-Principles Calculation

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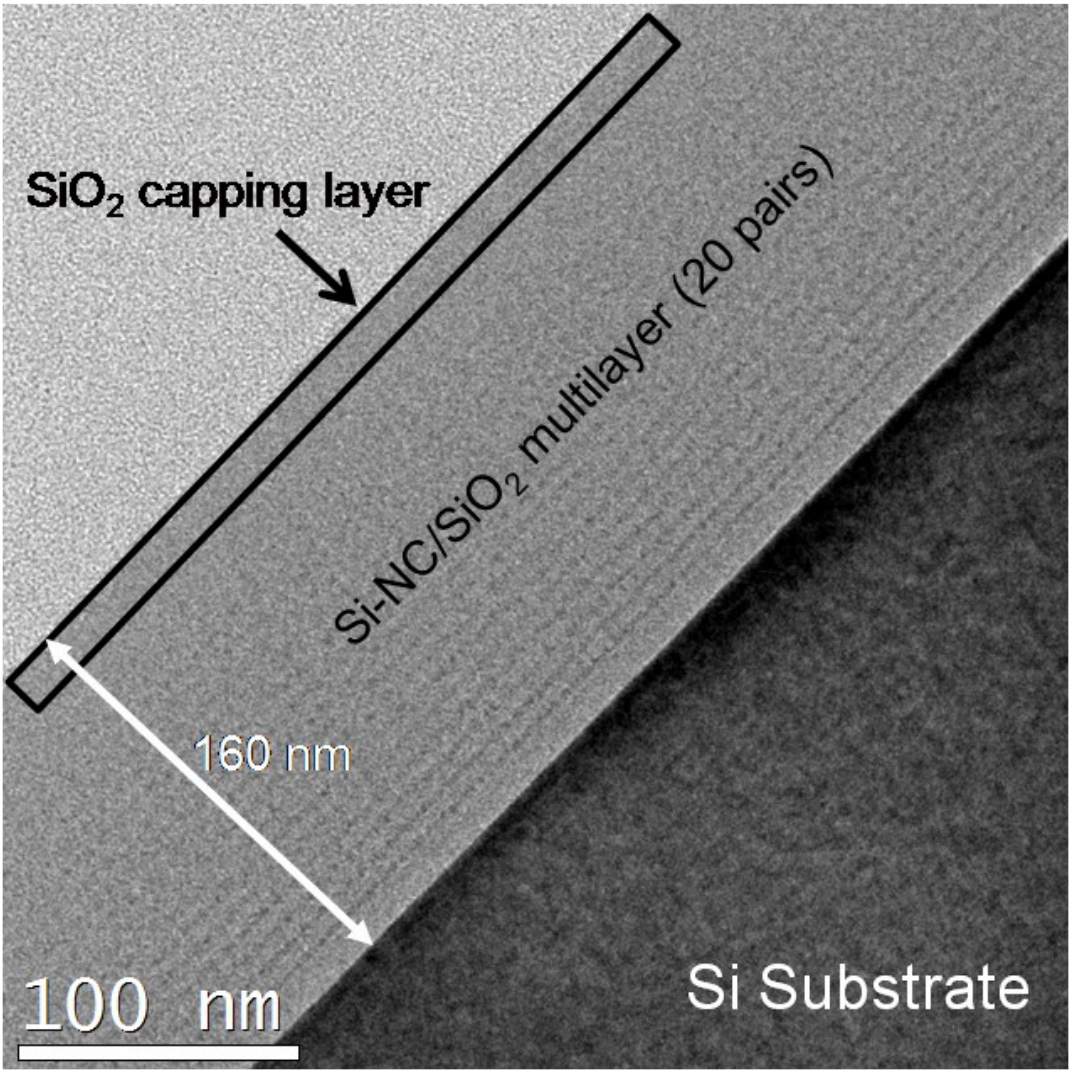

Figure S1. Cross-sectional TEM image for Si NC/SiO_2 multilayer sample after N_2 annealing at 1100 °C.

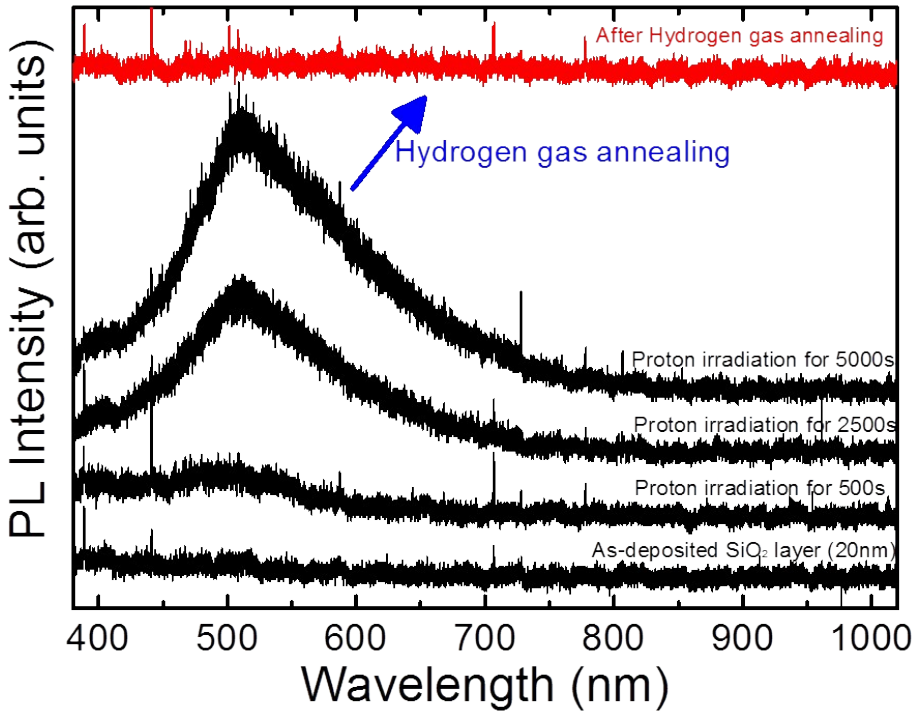

Figure S2. Changes in PL spectrum following PI and H_2 gas annealing for thin film (20 nm) containing only SiO_2.

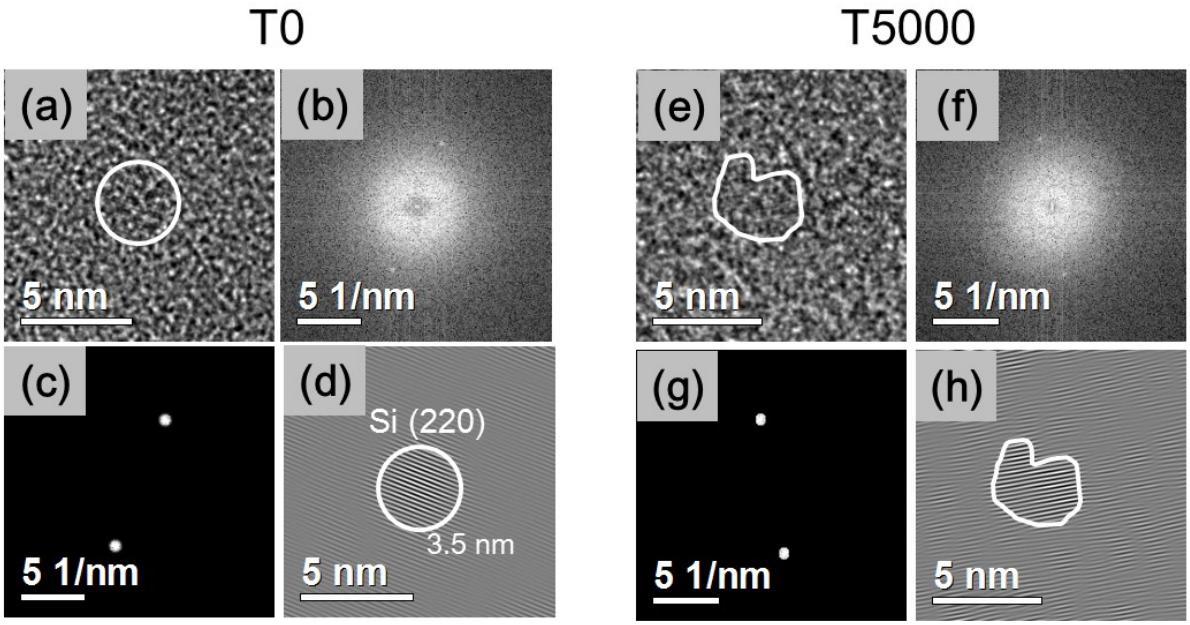

Figure S3 (a) and (e): Cross-sectional TEM images for a single Si NC before and after PI in Figure 2. (b) and (f): Fourier transforms of the HRTEM images in (a) and (e). (c) and (g): Areas indicated by circular masks in Fourier spaces in (b) and (f). (d) and (h): Bragg-filtered HRTEM images for the areas selected in (c) and (g).

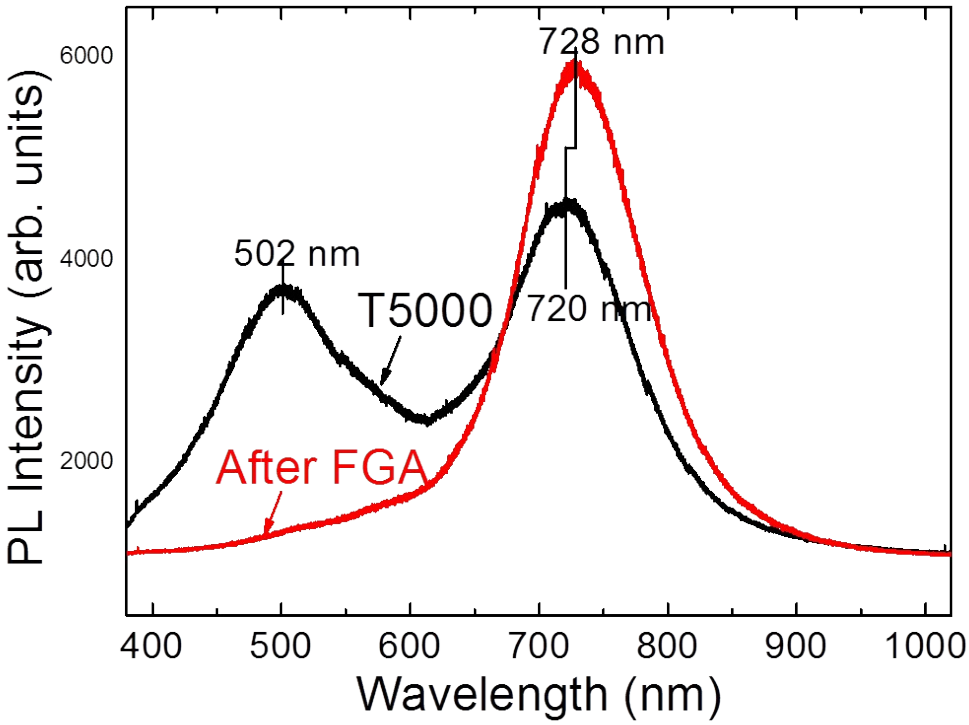

Figure S4. PL spectra before and after H annealing for the T5000 sample.

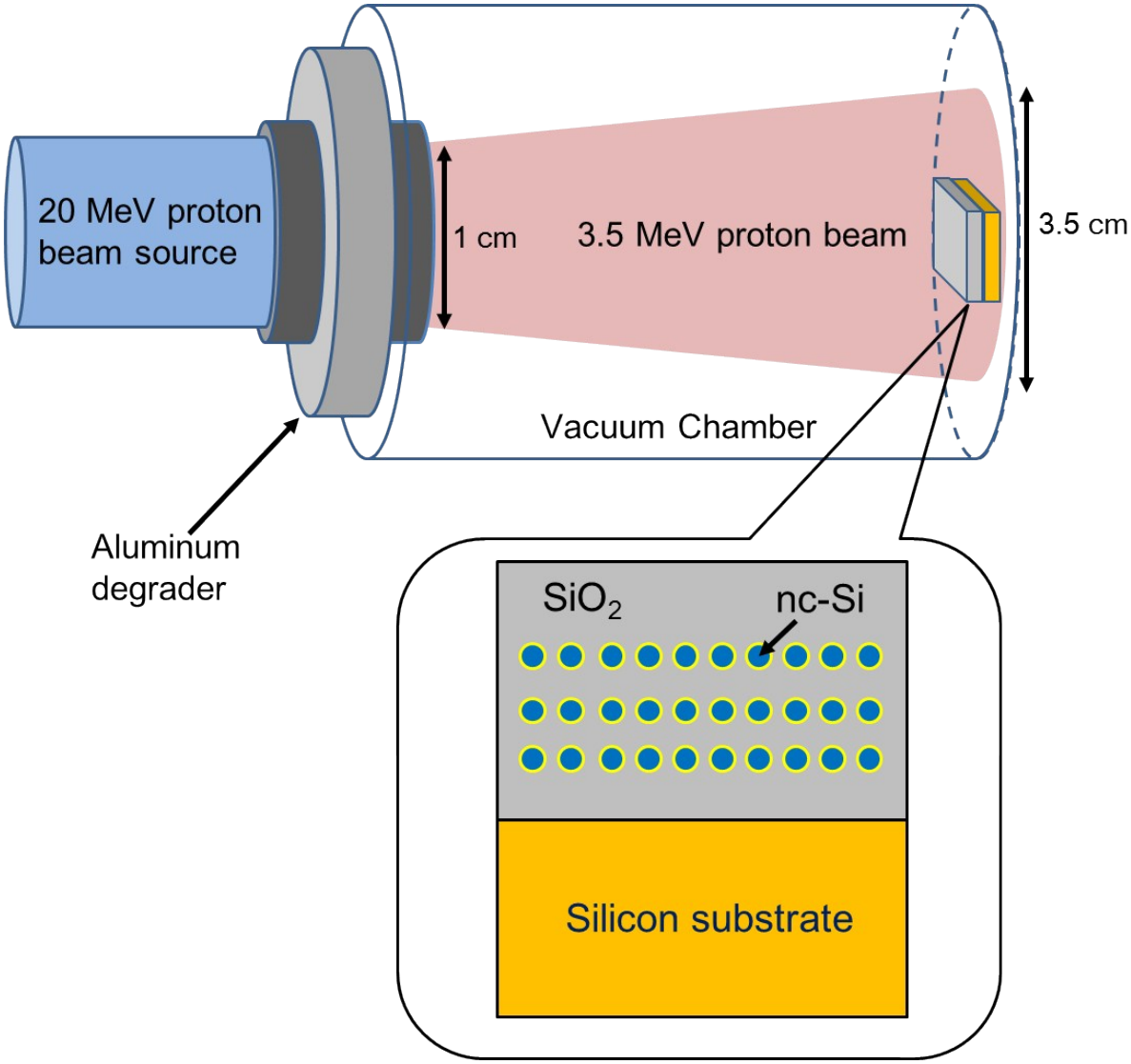

Figure S5. (Color online) Schematic diagram of the PI process for the Si NC/SiO_2 multilayer structure.