Supporting information

Preparation and characterization of solid DNA silver nanoclusters with superior aerobic and thermal stability

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Figure S1: (a) The plot of the absorbance vs. the integrated fluorescence of the r-AgNCs solution (10 mM ammonium acetate, pH=7.0) and the cresyl violet perchlorate methanol solution. The FL quantum yield (Q) of the r-AgNCs solution is calculated using the slope (m) of the linear fit of both lines. The FL quantum yield can be determined using the following equation:

 $Q_{red AgNCs} = Q_{cresyl \ violet} \left(\frac{m_{red AgNCs}}{m_{cresyl \ violet}}\right) \left(\frac{refractive \ index \ _{water}}{refractive \ index \ _{methanol}}\right)^2$

The raw data of the cresyl violet perchlorate methanol solution and the r-AgNCs aqueous solution is indicated in (b) and (c), respectively.



Figure S2: The emission spectra of the r-AgNCs solution (a) degassed by the freeze-pump-thaw method and stored in anaerobic cuvette (b) stored in 4° C refrigerator. The inset shows the evolution of the relative FL intensity (F/F₀) of the r-AgNCs. F indicates the integrated FL intensity measured at different days, while the F₀ indicates the integrated FL intensity of the as-prepared r-AgNCs solution.



Figure S3: The emission spectra of the r-AgNCs-r, the r-AgNCs-v and the r-AgNCs-f dissolved in ammonium acetate solution: (a) no treatment ; (b) added 30μ M NaBH₄ into the solution; (c) annealed the solution at 90° C for 10 minutes, and added 30μ M NaBH₄ in the solution after cooling to the room temperature. The spectra of the as-prepared r-AgNCs are indicated by the gray dash-dot curves.



Figure S4 The steady-state excitation and emission spectra of the r-AgNCs-p. The intensity drop at the wavelength >830 nm is due to the low quantum efficiency of PMT at this range (R928).



Figure S5: The TEM image of the r-AgNCs-p (3 days) dissolved in 10 mM ammonium acetate buffer (pH=7.0).



Figure S6: Native polyacrylamide gel electrophoresis analysis of the as-prepared r-AgNCs and r-AgNCs recovered from the r-AgNCs-p. a: $d[T_2C_3AC_3AC_4G_2C_3]$ DNA; b: as-prepared r-AgNCs solution ; c:r-AgNCs-p solution (0 days) d: r-AgNCs-p solution (129 days). The band I and II correspond to the signal of the $d[T_2C_3AC_3AC_4G_2C_3]$ DNA and the r-AgNCs, respectively.



Figure S7: Native polyacrylamide gel electrophoresis analysis of the as-prepared r-AgNCs and r-AgNCs recovered from the r-AgNCs-p. a: $d[T_2C_3AC_3AC_4G_2C_3]$ DNA; b: as-prepared r-AgNCs solution; c:r-AgNCs-p solution (0 days) d: r-AgNCs-p solution (21 days). The PAGE was imaged under the 375 nm excitation.



Figure S8: The FL anisotropy decay dynamics of the r-AgNCs-p (28 days) solution. For comparsion, the anisotropy decay of the as-prepared r-AgNCs is indicated by gray curve.



Figure S9: The steady state spectra of the r-AgNCs solution stored at 70°C for 360 minutes. For comparison, the spectra of the as-prepared r-AgNCs is indicated by the gray dash-dot curves.



Figure S10: The steady-state spectra of the precipitated Hum 22 AgNCs solution. The bracket indicates the days of the precipitated Hum 22 AgNCs stored in the laboratory drawers. The inset shows the time-evolution of the integrated FL intensity. The spectrum of the as-prepared Hum 22 AgNCs is indicated by gray dash-dot curve.