Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Interactions of the Primers and Mg2+ with Graphene Quantum Dots Enhance PCR Performance

Meidong Zhu, Chao Luo, Fangwei Zhang, Fei Liu, Jingyan Zhang, Shouwu Guo

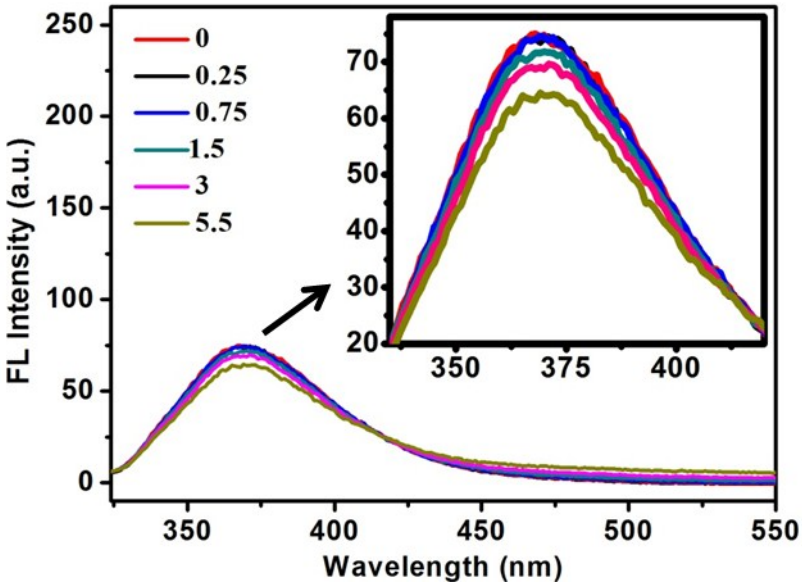

Figure S1. GQDs interact with double-stranded DNA weakly. GQDs (0, 0.25, 0.75, 1.5, 3, 5.5 ng/μL) quench barely the fluorescence of the 2-Ap labeled double- stranded DNA (5'-CGC TAA CGG 2ApTT CAC CAC-3', and 3'-GCG ATT GCCT AA GTG GTG-5', 25mM) at room temperature.

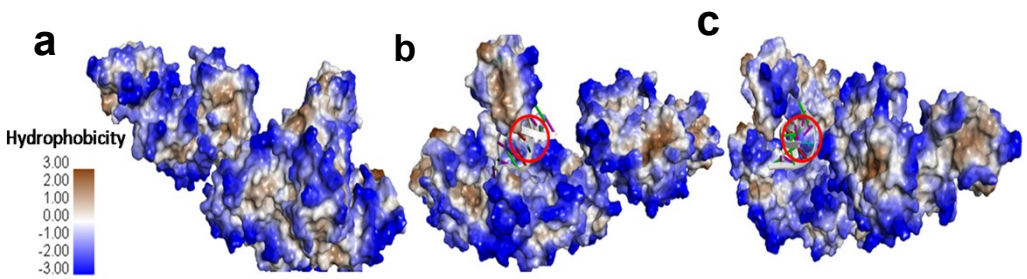

Figure S2. The distribution of hydrophobic areas on Taq polymerase surface. The hydrophobicity from blue zone to gray zone increase gradually. The area marked by a red circle is the active center of Taq polymerase. a, b, and c were the different perspectives of the structure of Taq polymerase.

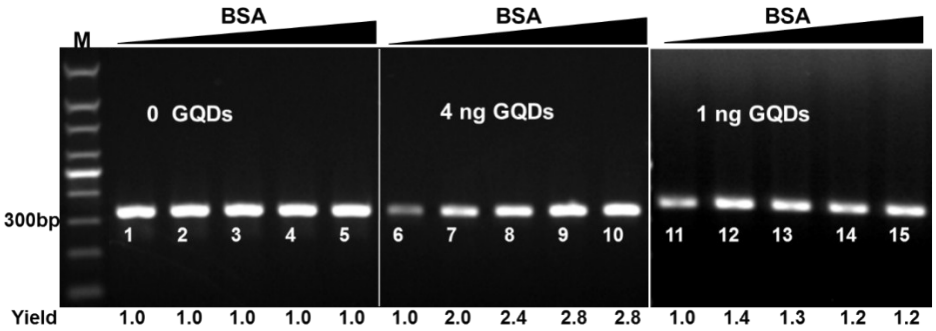

Figure S3. High concentration of BSA can reverse the suppression by excessive GQDs on PCR, but can not affect the optimization of GQDs. Each group contain 0, 0.08, 0.24, 0.40, 0.54 μg/μL of BSA from left to right, respectively. Lanes 1-5, 6-10, 11-15 contain 0, 4, and 1 ng of GQDs, respectively. PCR product yield of the first lane in each case (lanes 1, 6 and 11) was taken as 1, the yield of others are relative to them, respectively. The template was PBR322 plasmid. PCR conditions are described in the experimental section.

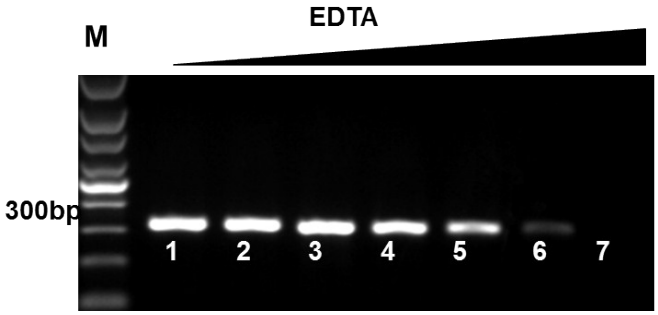

Figure S4. EDTA can inhibit PCR by chelating Mg^{2+}. Lanes 1-7 contain 0, 1, 1.2, 1.4, 1.6, 1.8 and 2 mM of EDTA, respectively. The Mg^{2+} was 2.5 mM. The template was PBR322 plasmid. PCR conditions are described in the experimental section.

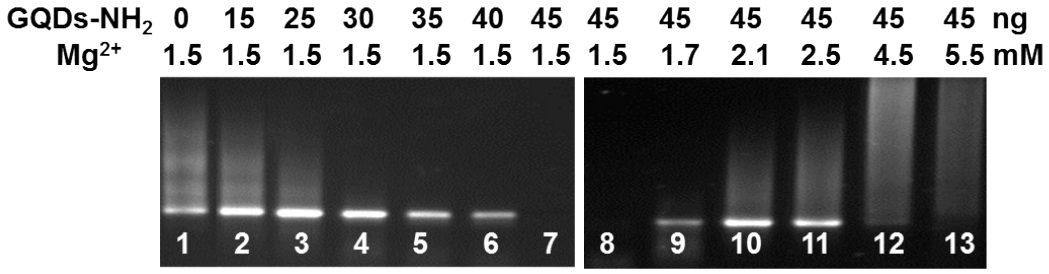

Figure S5. 30 ng of GQDs-NH_2 was needed to improve the specificity of round-2 PCR; and only 2.1 mM of Mg^{2+} was needed to reverse the suppression generated by GQDs-NH_2. The template was PBR322 plasmid. PCR conditions are described in the experimental section.