**Supporting Information**

Fig. S1a Effect of hairpin DNA and aptamer reaction time on RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, 150.0 mM, and 0.4 nM, respectively. The reaction temperature of Exo Ш was 20℃. The quantity of bases in the complementary pairing of the hairpin DNA and aptamer was 5. The reaction time of Mg2+ was 120 min. The pH of the Tris-HCl buffer solution was 7.4.)

Fig. S1b Effect of the quantity of bases on the complementary pairing of hairpin DNA and aptamer in RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, 150.0 mM, and 0.4 nM, respectively. The reaction temperature of Exo Ш was 20℃. The reaction time of the hairpin DNA and aptamer was 120 min. The reaction time of Mg2+ was 120 min. The pH of the Tris-HCl buffer solution was 7.4.)

Fig. S2 Effect of Mg2+ concentration on RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, and 0.4 nM, respectively. The reaction time of hairpin DNA and aptamer was 120 min. The reaction temperature of Exo Ш was 20℃. The quantity of bases in the complementary pairing of hairpin DNA and aptamer was 3. The reaction time of Mg2+ was 120min. The pH of the Tris-HCl buffer solution was 7.4.)

Fig. S3aThe effect of Exo III reaction temperature on RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, 200.0 mM, and 0.4 nM, respectively. The reaction time of hairpin DNA and aptamer was 120 min. The quantity of bases in the complementary pairing of hairpin DNA and aptamer was 3. The reaction time of Mg2+ was 120 min. The pH of the Tris-HCl buffer solution was 7.4.)

Fig. S3bEffect of Exo Ш concentration on RRS spectra. (The concentrations of hairpin DNA, aptamer, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 200.0 mM, and 0.4 nM, respectively. The reaction time of hairpin DNA and aptamer was 120 min. The quantity of bases in the complementary pairing of hairpin DNA and aptamer was 3. The reaction temperature of Exo Ш was 4℃. The reaction time of Mg2+ was 120 min. The pH of the Tris-HCl buffer solution was 7.4.)



Fig. S1a Effect of hairpin DNA and aptamer reaction time on RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, 150.0 mM, and 0.4 nM, respectively. The reaction temperature of Exo Ш was 20℃. The quantity of bases in the complementary pairing of the hairpin DNA and aptamer was 5. The reaction time of Mg2+ was 120 min. The pH of the Tris-HCl buffer solution was 7.4.)



Fig. S1b Effect of the quantity of bases on the complementary pairing of hairpin DNA and aptamer in RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, 150.0 mM, and 0.4 nM, respectively. The reaction temperature of Exo Ш was 20℃. The reaction time of the hairpin DNA and aptamer was 120 min. The reaction time of Mg2+ was 120 min. The pH of the Tris-HCl buffer solution was 7.4.)



Fig. S2 Effect of Mg2+ concentration on RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, and 0.4 nM, respectively. The reaction time of hairpin DNA and aptamer was 120 min. The reaction temperature of Exo Ш was 20℃. The quantity of bases in the complementary pairing of hairpin DNA and aptamer was 3. The reaction time of Mg2+ was120 min. The pH of the Tris-HCl buffer solution was 7.4.)



Fig. S3aThe effect of Exo III reaction temperature on RRS spectra. (The concentrations of hairpin DNA, aptamer, Exo Ш, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 5.0 U/µL, 200.0 mM, and 0.4 nM, respectively. The reaction time of hairpin DNA and aptamer was 120 min. The quantity of bases in the complementary pairing of hairpin DNA and aptamer was 3. The reaction time of Mg2+ was 120 min. The pH of the Tris-HCl buffer solution was 7.4.)



Fig. S3b Effect of Exo Ш concentration on RRS spectra. (The concentrations of hairpin DNA, aptamer, Mg2+ and dopamine were 3.0 µM, 3.0 µM, 200.0 mM, and 0.4 nM, respectively. The reaction time of hairpin DNA and aptamer was 120 min. The quantity of bases in the complementary pairing of hairpin DNA and aptamer was 3. The reaction temperature of Exo Ш was 4℃. The reaction time of Mg2+ was 120min. The pH of the Tris-HCl buffer solution was 7.4.)

Table S1 Type of hairpin DNA.

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| Oligomer | sequence（5’→ 3’） |
| Hairpin DNA1 | GACAGGGTGGGGAGGGTGGGGCCACCCT |
| Hairpin DNA2 | GAGACAGGGTGGGGAGGGTGGGGCCACCCT |
| Hairpin DNA3 | CAGAGACAGGGTGGGGAGGGTGGGGCCACCCT |
| Hairpin DNA4 | CACAGAGACAGGGTGGGGAGGGTGGGGCCACCCT |
| Hairpin DNA5 | CACACAGAGACAGGGTGGGGAGGGTGGGGCCACCCT |