Supplementary Information (SI) for Analytical Methods.

A Magnetic Separation-Based Dual-Mode Aptasensor Integrating FRET Fluorescence and UV Absorption for Early Diagnosis of Hepatocellular Carcinoma

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Reagents

All reagents were of analytical grade unless otherwise stated. NHS-magnetic beads, FAM-labeled aptamers (P1), SH-modified P2 chains, silver nitrate ($AgNO_3$), sodium borohydride ($NaBH_4$), trithiocyanuric acid (TSC), BHQ dye, HepG2 cells, A549 cells, MCF-7 cells, LNCaP cells, fetal bovine serum (FBS), phosphate-buffered saline (PBS, pH 7.4), and anhydrous ethanol were purchased from Sigma-Aldrich (St. Louis, MO, USA). Ultra-pure water (18.2 MΩ·cm) was used throughout the experiment.

Instruments

The instruments used in the experiment included: UV-Vis spectrophotometer (UV-2600, Shimadzu, Japan), fluorescence spectrophotometer (F-7000, Hitachi, Japan), centrifuge (5810R, Eppendorf, Germany), magnetic stirrer (MS-H-Pro+, Dragon Lab, China), transmission electron microscope (TEM, JEM-2100, JEOL, Japan), ultra-pure water machine (Milli-Q, Merck, Germany), biosafety cabinet (BSC-1300IIA2, Haier, China), and cell incubator (CO_2-160, Memmert, Germany).

Table S1 DNA sequences (5′-3′) utilized in this work.

Strand	Sequence (5′-3′)
F1 (TLS11a)	NH_2-ACAGCATCCCCATGTGAACAATCGCATTGTGATTGTTACGGTTTC CGCCTCATGGACGTGCTG-FAM
F2	BHQ-CAGCACGTCCATGAGGCG-SH

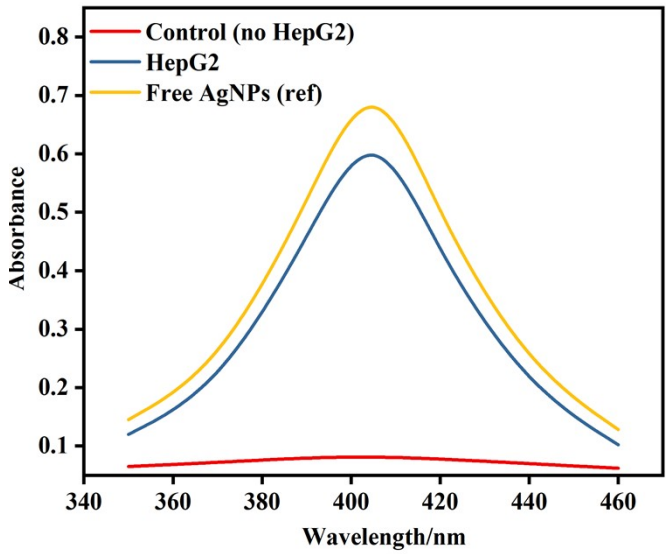

Figure S1. Direct validation of probe release efficiency. UV-Vis absorption spectra of supernatants collected after magnetic separation: control group without HepG2 cells (red), HepG2-treated group (blue), and free AgNPs reference (yellow).