Electronic supplementary information

Moderate Molecular Recognitions on ZnO *m*-Plane and Their Selective Capture/Release of Bio-related Phosphoric Acids

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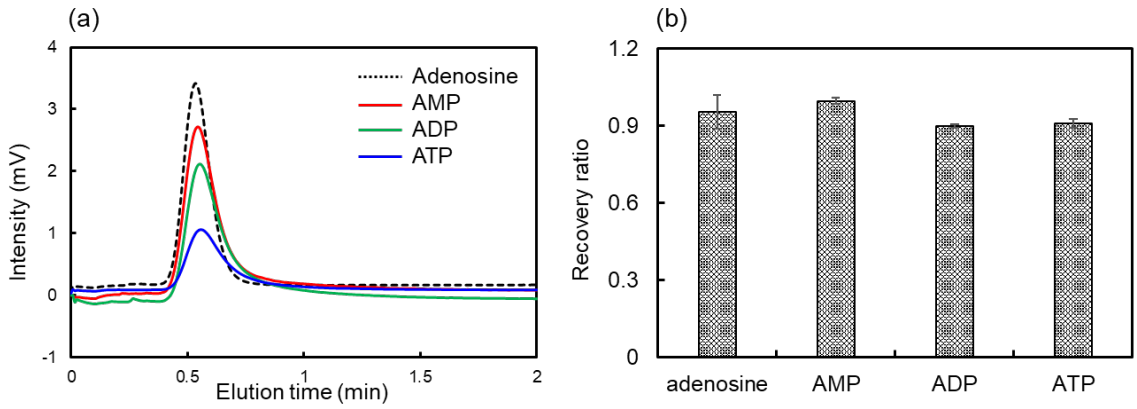

Fig. S1 Retention behaviors of adenosine, AMP, ADP, and ATP on the column fabricated only the ZnO seed layer (Seed layer column). (a) Typical chromatograms of adenosine and nucleotides. (b) Recovery ratio of each compound. LC condition: column, seed layer (30 cm × 100 μm), bare capillary (30 cm × 100 μm); mobile phase, water; flow rate, 5.0 μL/min; temperature, 25 °C; detection, UV (260 nm).

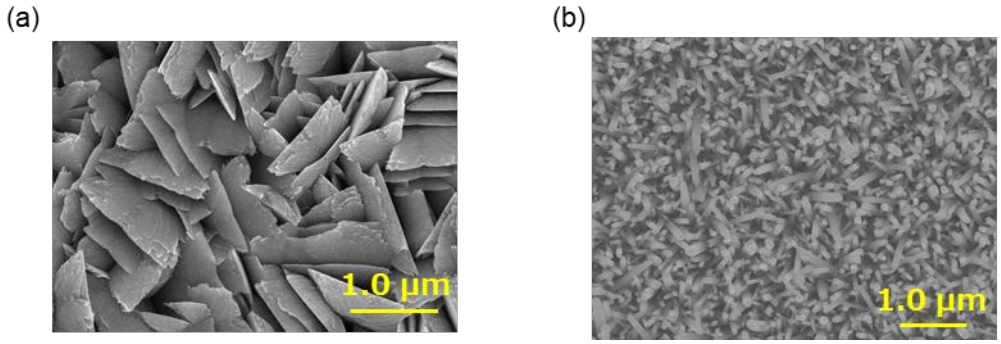

Fig. S2 SEM images of (a) ZnO nanowalls and (b) ZnO NWs on silicon wafers.

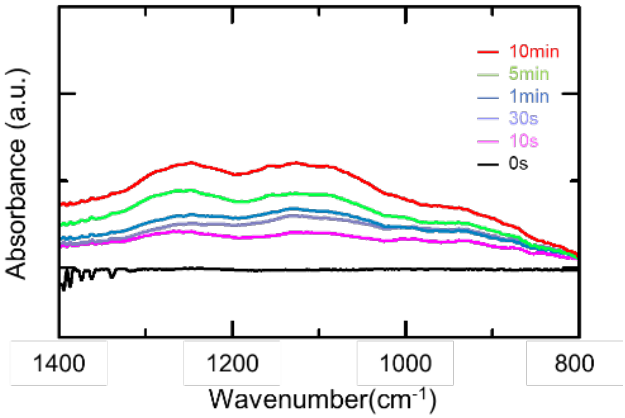

Fig. S3 IR peak shifts of ATP on ZnO NWs with different immersion time in ATP solution. The black line shows the IR spectra of ZnO NWs before immersion.

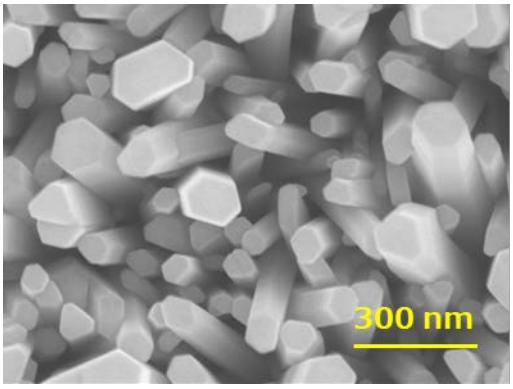

Fig. S4 SEM image on the top surface of ZnO NWs.

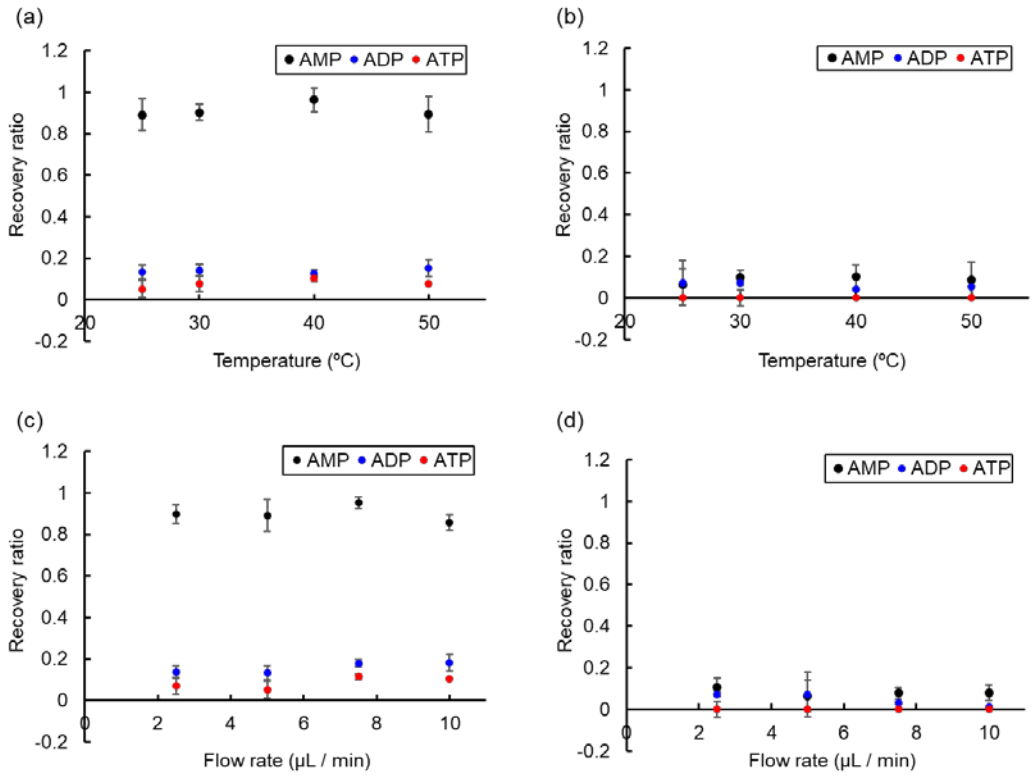

Fig. S5 Retention behaviors of nucleotides at different temperatures or flow rates on ZnO NWs column. (a), (b) Plot of recovery ratio of nucleotides vs temperature. (c), (d) Plot of recovery ratio of nucleotides vs flow rate. LC condition: column, ZnO-NWs (30 cm × 100 μm), bare capillary (30 cm × 100 μm); mobile phase, (a), (c) water, (c), (d) ACN; detection, UV (260 nm).

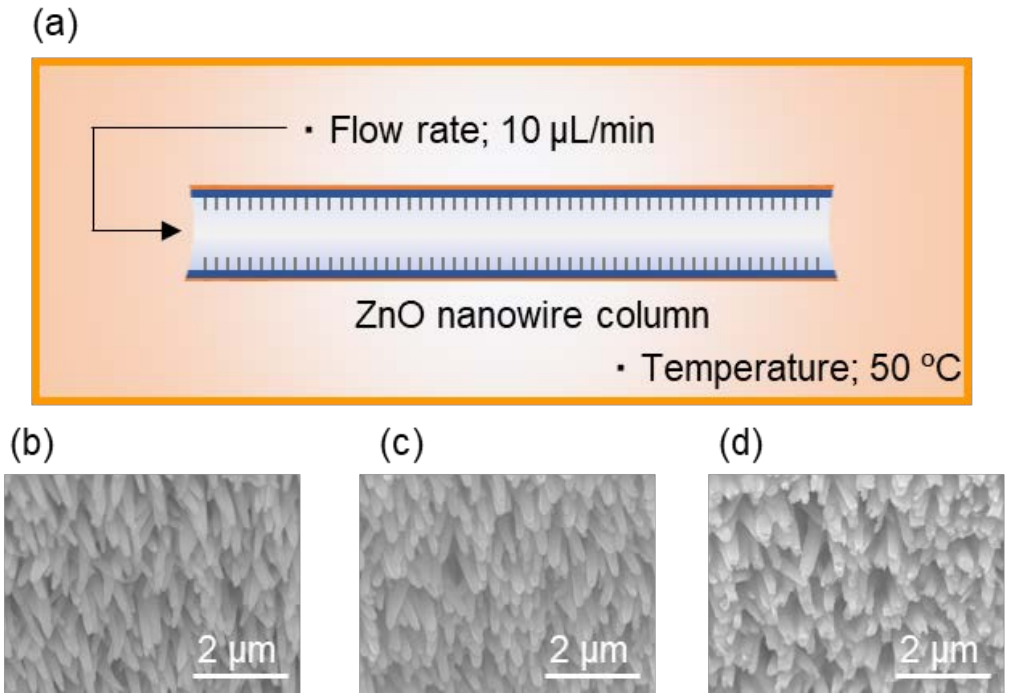

Fig. S6 Physical damage test of the ZnO NWs after LC analysis. (a) Schematic diagram of physical damage test. (b) SEM image of ZnO NWs before LC analysis. (c) SEM image of ZnO NWs after LC analysis at high flow rate of 10 μL/min, (c) SEM image of ZnO NWs after LC analysis at 50 °C.

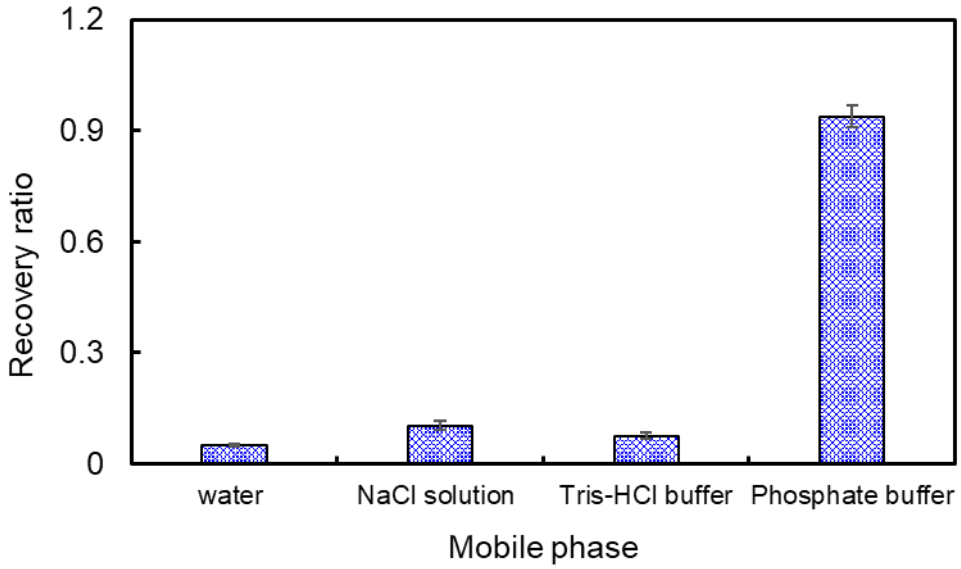

Fig. S7 Recovery ratio of ATP in each electrolyte solution as the mobile phase. LC condition: column, ZnO-NWs (30 cm × 100 μm), bare capillary (30 cm × 100 μm); mobile phase, NaCl solution, Tris-HCl buffer and phosphate buffer; flow rate, 5.0 μL/min; temperature, 25 °C; detection, UV (260 nm).

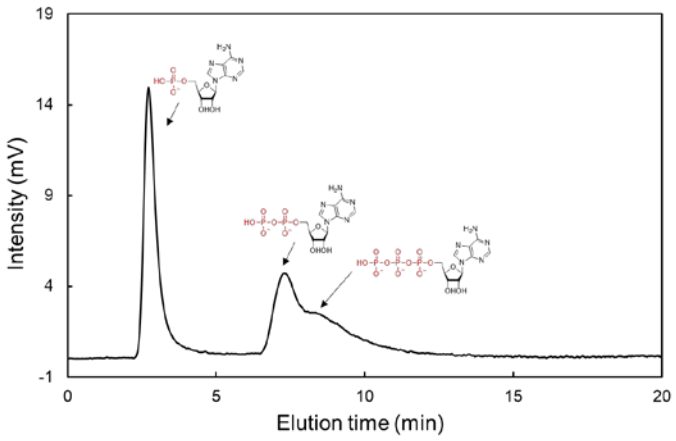

Fig. S8 Chromatogram of nucleotides with the short ZnO NWs column with phosphate gradient condition. LC condition: column, ZnO-NWs column (30 cm × 100 μm); mobile phase, (A) water, (B) 250 mM phosphate buffer; 0-1 min, 0% B, 1-21 min 0% B to 100% B; flow rate, 1.0 μL/min; temperature 25 °C; detection, UV (260 nm).

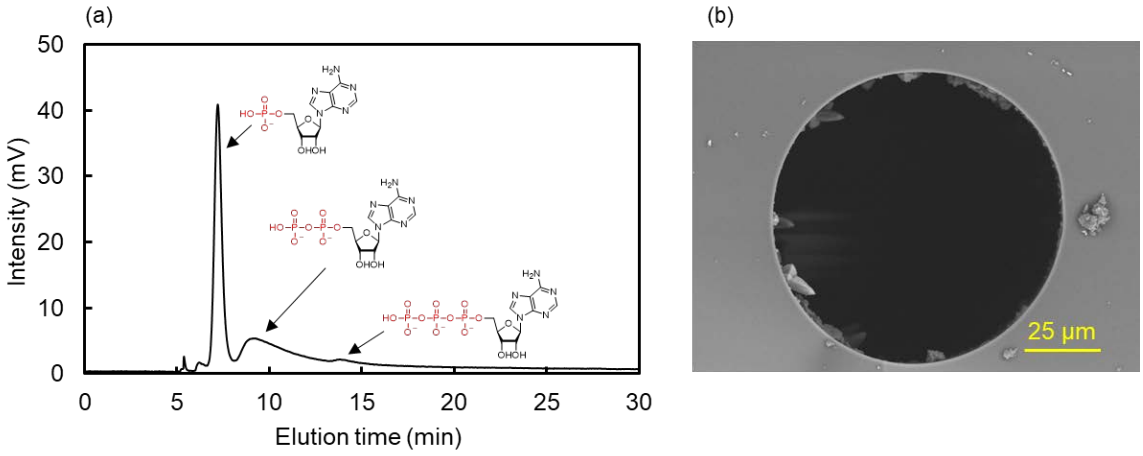

Fig. S9 (a) Chromatogram of nucleotides in the second phosphate gradient separation. (b) Cross section of ZnO NWs column after phosphate gradient separation. LC condition: column, ZnO-NWs column (90 cm × 100 μm); mobile phase, (A) water, (B) 250 mM phosphate buffer; 0-1 min, 0% B, 1-21 min 0% B to 100% B, 21-30 min 100% B; flow rate, 1.0 μL/min; temperature 25 °C; detection, UV (260 nm).

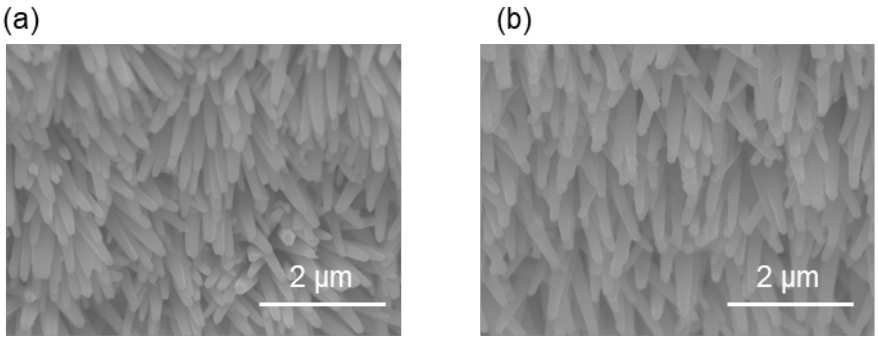

Fig. S10 Chemical corrosion test of ZnO NWs in electrolyte solutions. The SEM images of ZnO NWs nanowire after soaked in (a) NaCl solution and (b) Tris-HCl buffer. For these electrolyte solutions, the ionic strength was unified to 0.2 M. LC condition: column, ZnO-NWs (30 cm × 100 μm), bare capillary (30 cm × 100 μm); mobile phase, NaCl solution, Tris-HCl buffer and phosphate buffer; flow rate, 5.0 μL/min; temperature, 25 °C; detection, UV (260 nm).

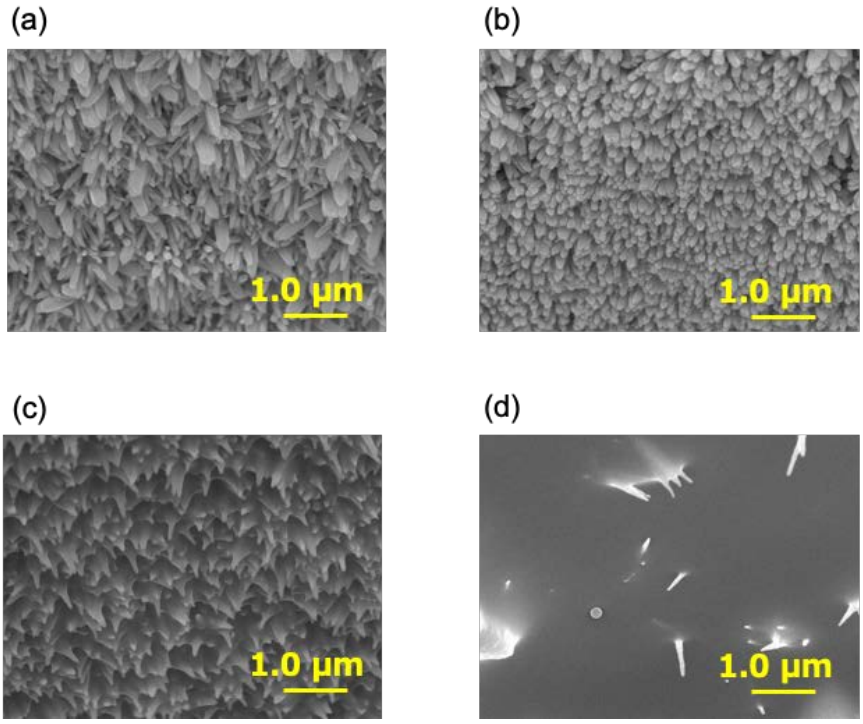

Fig. S11 SEM images of annealed and as-grown ZnO NWs after immersion into 100mM phosphate buffer (pH 7.0). Annealed ZnO NWs immersing into phosphate buffer for (a) 1 hour, (b) 5 hours. As-grown ZnO NWs immersing into phosphate buffer for (c) 1 hour, (d) 5 hours.