

Supplementary Materials

Selective, Reversible, Reagentless Maltose Biosensing with Core-Shell Semiconducting Nanoparticles

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MALDI-TOF mass determination: 10 μ M Protein samples were loaded on, washed on and eluted from a C₄ Zip-Tip. This solution was diluted 1:1 with a 50 mM acetonitrile solution of α -sinnapinic acid. Samples were spotted on a stainless steel MALDI target (Bruker) and analyzed on a Bruker Ultraflex MALDI-TOF instrument in reflectron mode. Masses of MBP-MT and phenanthroline modified K46C MBP-MT (minus [Ru(NH₃)₄]²⁺ fragment during ionization) were calculated to be 44038 m/z and 44319 m/z. The MALDI determined [M+H]⁺ masses were 44049 \pm 40 m/z for MBP-MT samples and 44315 \pm 20 m/z for The Ru^{II} complex modified K46C MBP-MT samples (Fig. S1). The [M+2H]²⁺ masses were also consistent with the calculated masses.

Sugar cross-reactivity experiments with K25C MBP-MT derived biosensor: Thirty biosensor solutions (1 mL) were made from the same stock (50 nM K25C: CdSe@ZnS system) for cross-reactivity. The fluorescence emission spectrum was collected initially (Spex Fluorolog-3, 3 nm slit-widths, 1 second response time). Injection of a 50 mM sugar solution (1 μ L) was incubated for five minutes and the fluorescence emission spectrum was rerecorded. The following sugars were used for this library: D-fructose, D-glucose, D-mannose, D-xylose, D_ribose, L-arabinose, L-glucose, L-mannose, L-ribose, L-xylose, or D-maltose. Two additional determinations were performed for each sugar and the results were averaged and 95% confidence intervals calculated. Figure S2 displays the average sugar mediated displacement of the emission intensity and the 95% confidence interval as error bars. Only D-xylose, D-fructose, L-mannose, and L-xylose showed any significant change in emission intensity, where L-mannose was the only sugar that had a significant increase (1.03 \pm 0.02 fold) in emission intensity.

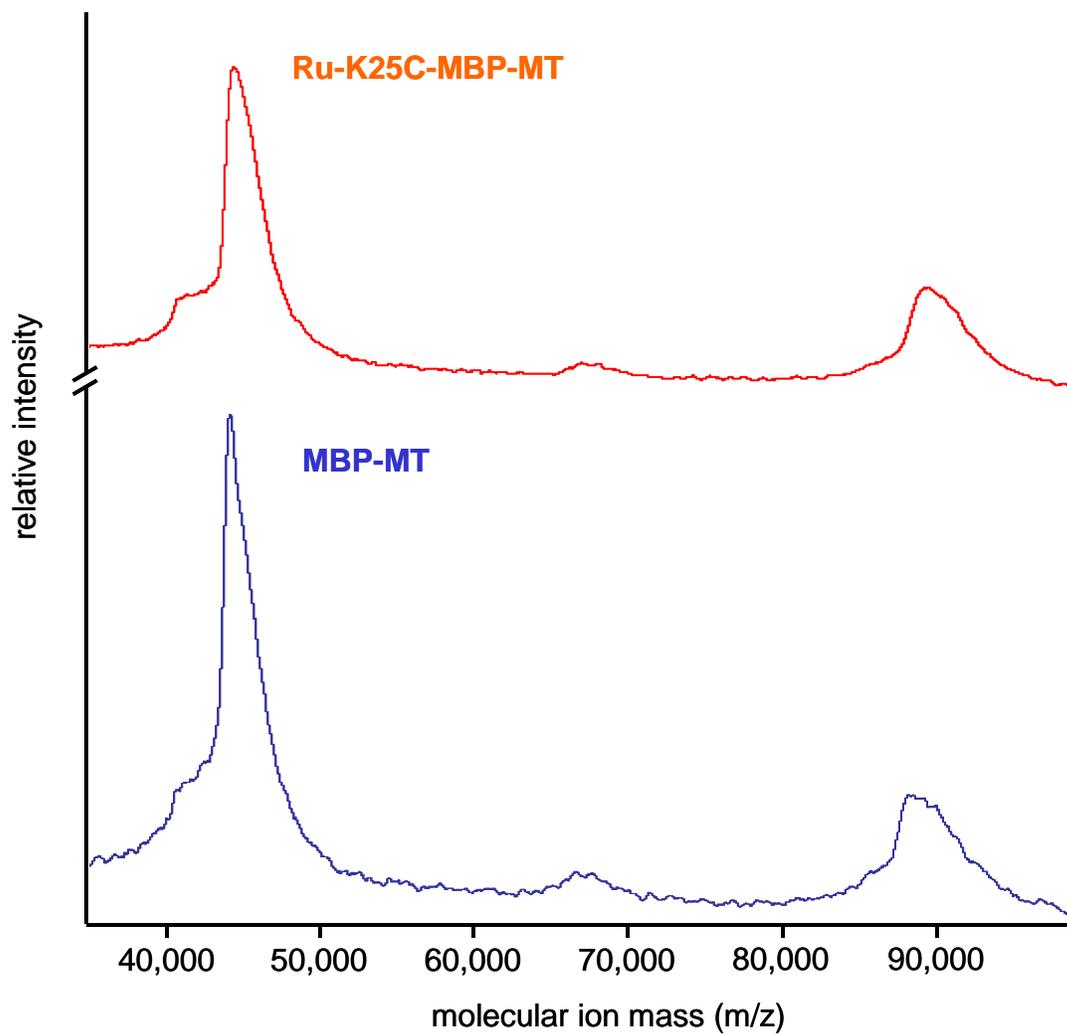


Figure S1. MALDI Spectra of MBP-MT and Ru^{II} complex modified K25C MBP-MT.

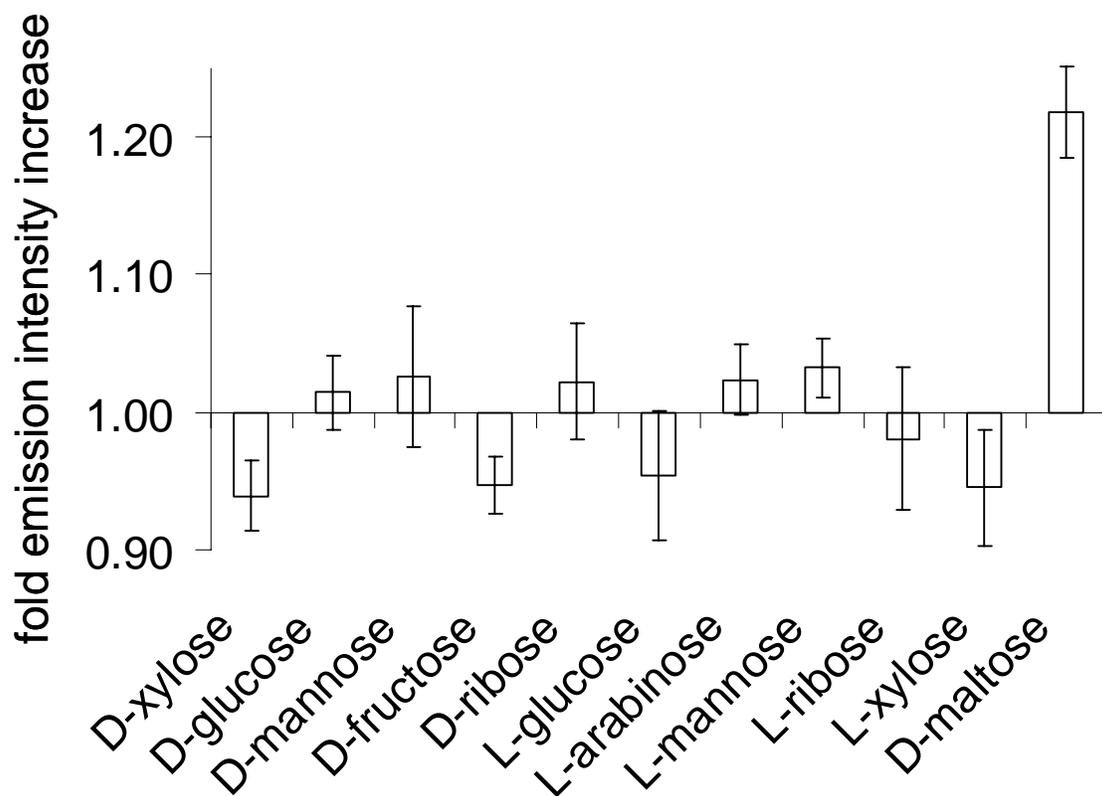


Figure S2. Histogram of emission intensity increases (average) after sugar addition and the 95% confidence intervals (error bars, 3 determinations).