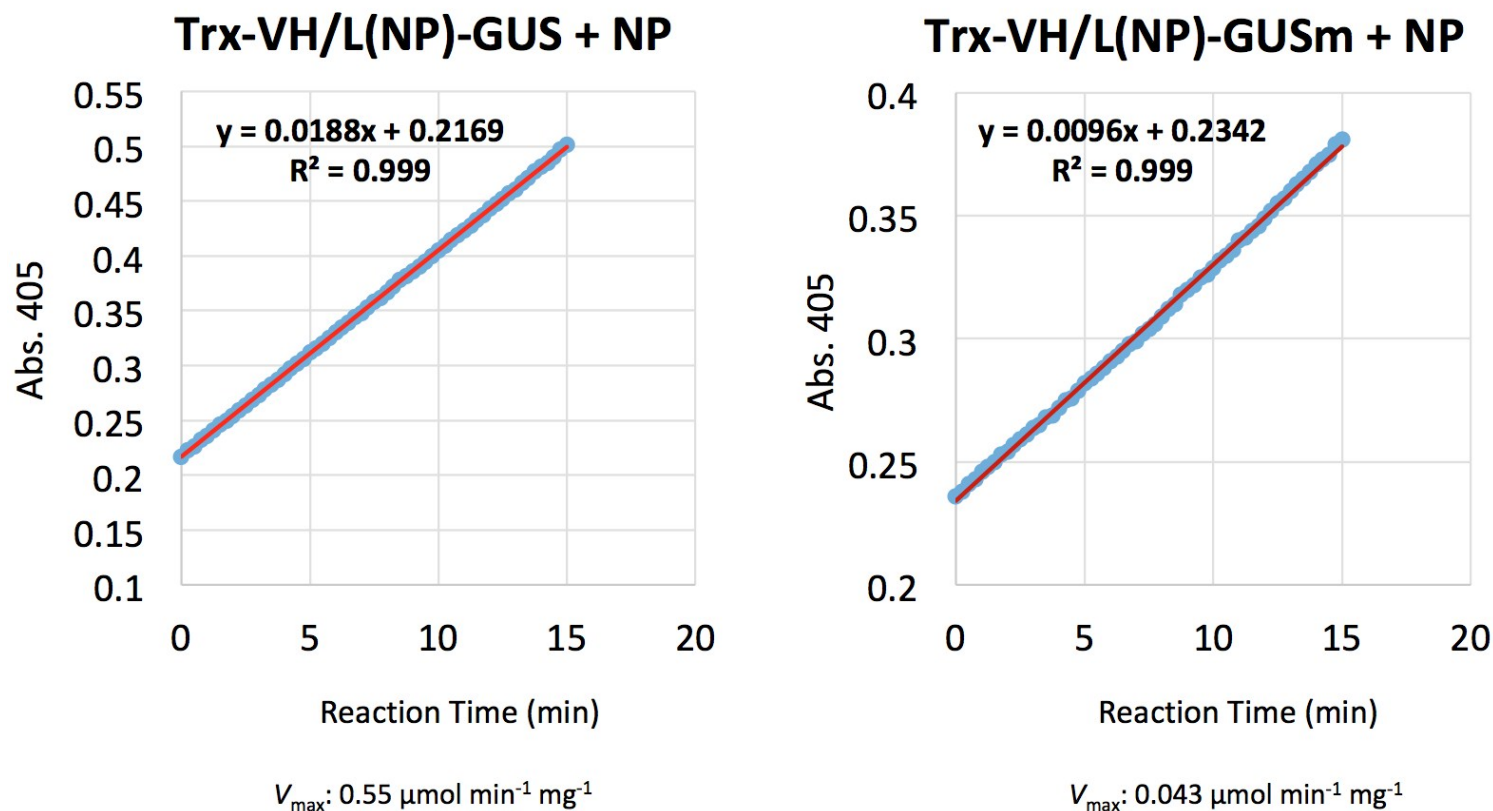


Supplementary Information 1. Comparison of enzyme activity



Mutant GUS fusion proteins and wild type GUS fusion proteins (0.1 μM each in PBST) were mixed with antigen (1 μM NP in PBST buffer), respectively. Absorbance at 405nm was measured every 15 seconds after adding substrate (1 mg/ml p-nitrophenyl- β -D-glucuronide in PBST) using a Beckman DU530 spectrophotometer.

Since the concentration of NP was lower than the saturation in terms of activity, considering the NP dose-dependency (1000 for 1 μM and 2500 for maximum activity), the maximum catalytic activity of GUSm is roughly estimated as 20% of the wild-type GUS.