Supporting Information

Magnetic graphene oxide nanocomposite as an effective support for lactase immobilization with improved stability and photothermal enhanced enzymatic activity

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Abbreviation in the figure legends of Fig. S1 to S10.

GO: Graphene oxide; mGO: Fe_3O_4-immobilized GO; mGE: Polyethyleneimine-modified mGO; mGP: Pyrene butyric acid-modified mGO; mGPP: Polyethyleneimine-modified mGP; mGO-Lactase: Lactase-immobilized mGO; mGE-Lactase: Lactase-immobilized mGE; mGPP-Lactase: Lactase-immobilized mGPP.

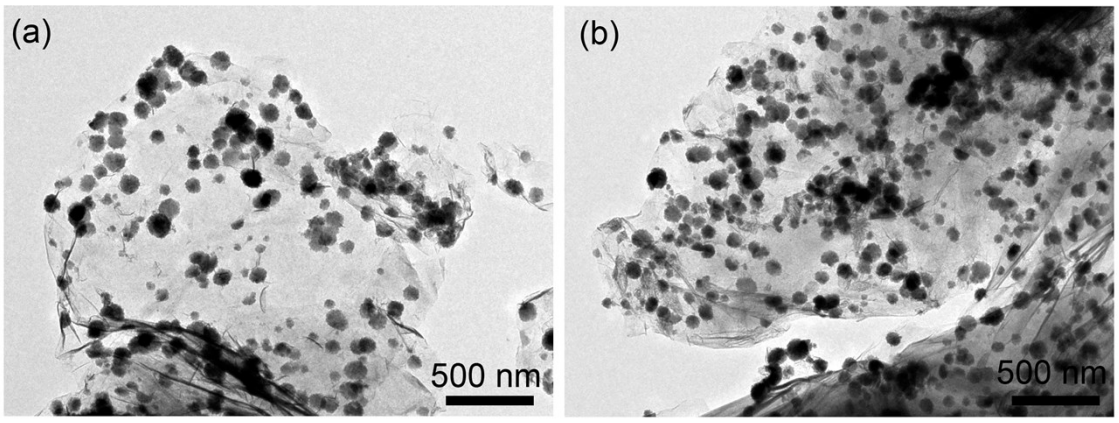

Fig. S1 TEM micrographs of mGO.

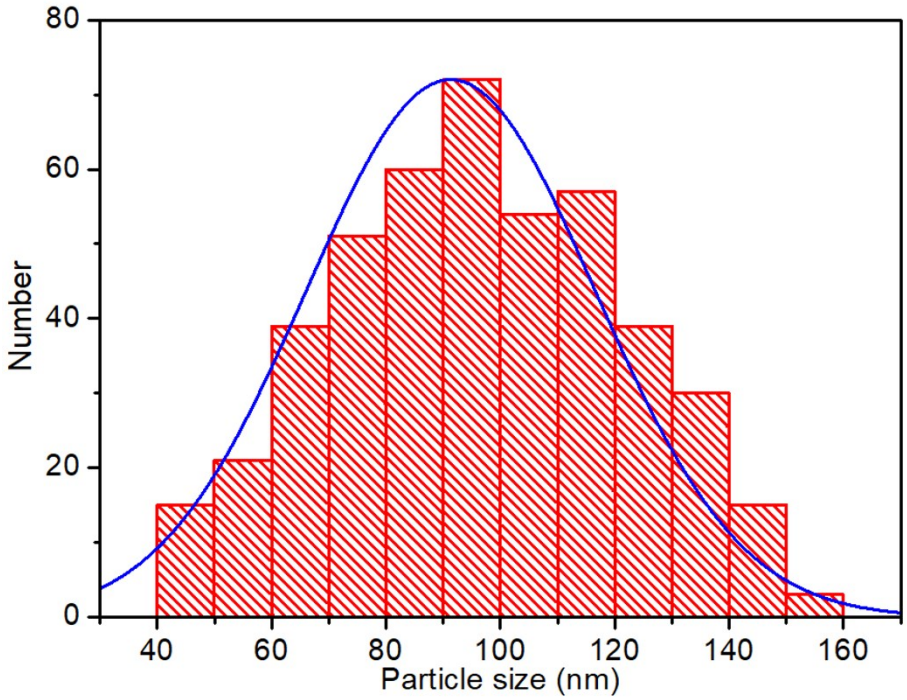

Fig. S2 The particle-size distribution of Fe_3O_4 nanoparticles on mGO and fitting Gaussian curve.

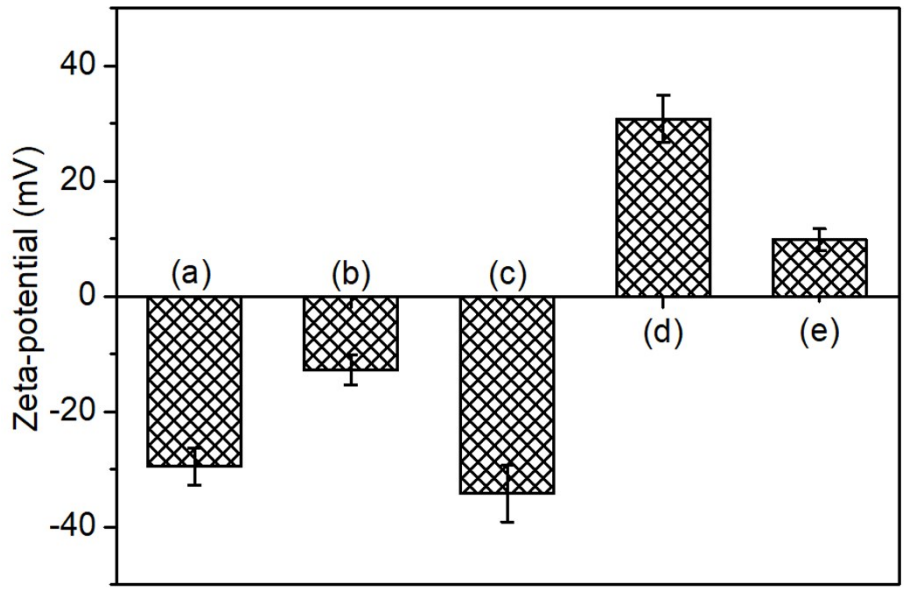

Fig. S3 Surface zeta potentials of GO (a), mGO (b), mGP (c), mGPP (d), and mGPP-Lactase (e).

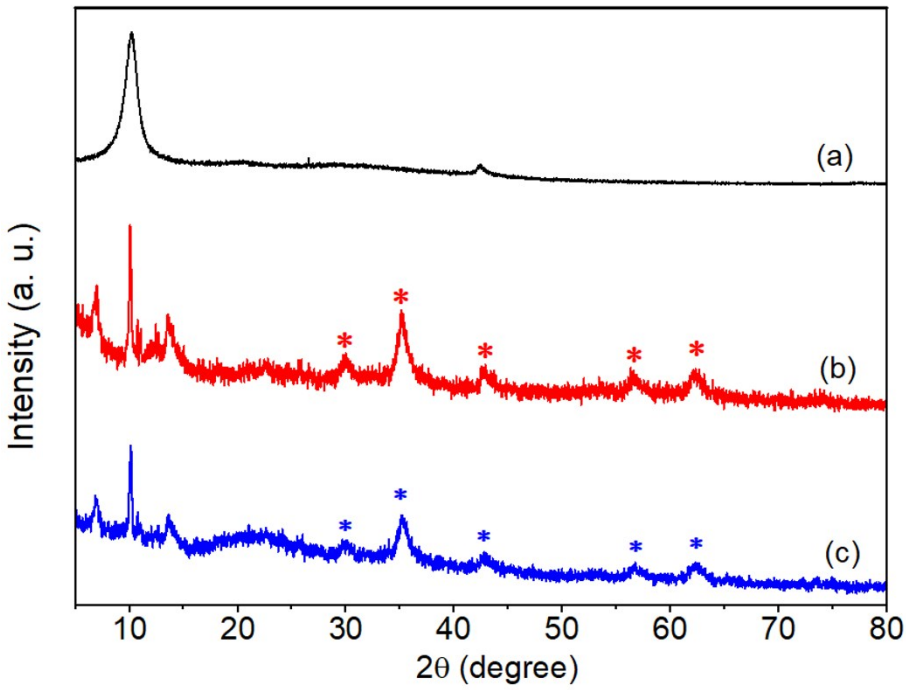

Fig. S4 XRD patterns of GO (a), mGO (b), and mGPP-Lactase (c).

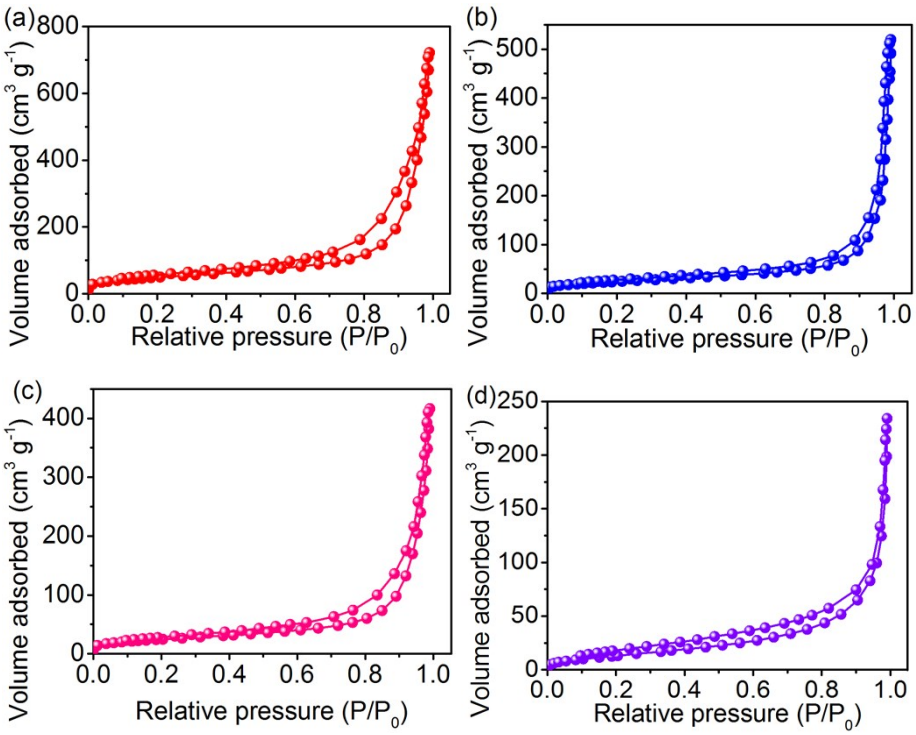

Fig. S5 Nitrogen adsorption-desorption isotherms of GO (a), mGO (b), mGP (c), and mGPP (d).

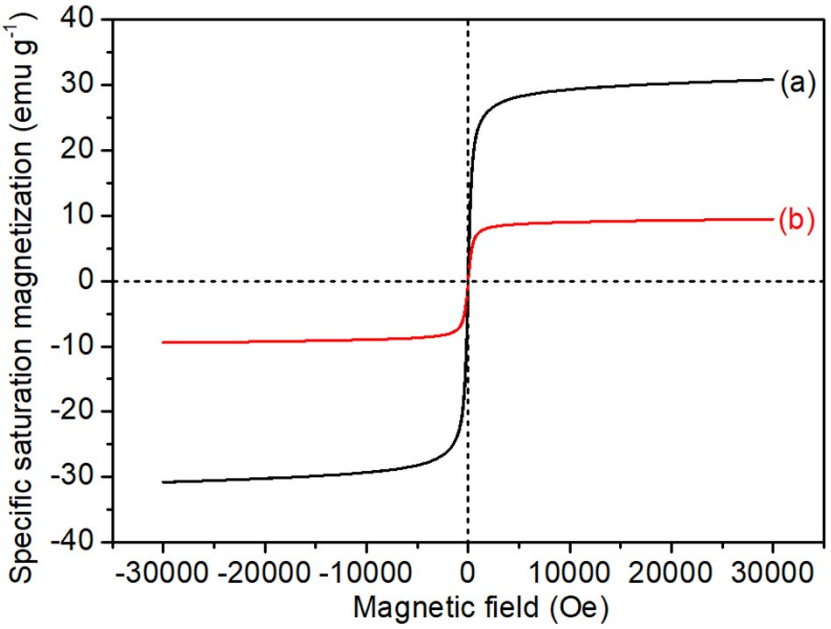

Fig. S6 Magnetic hysteresis loops of mGO (a), and mGPP-Lactase (b).

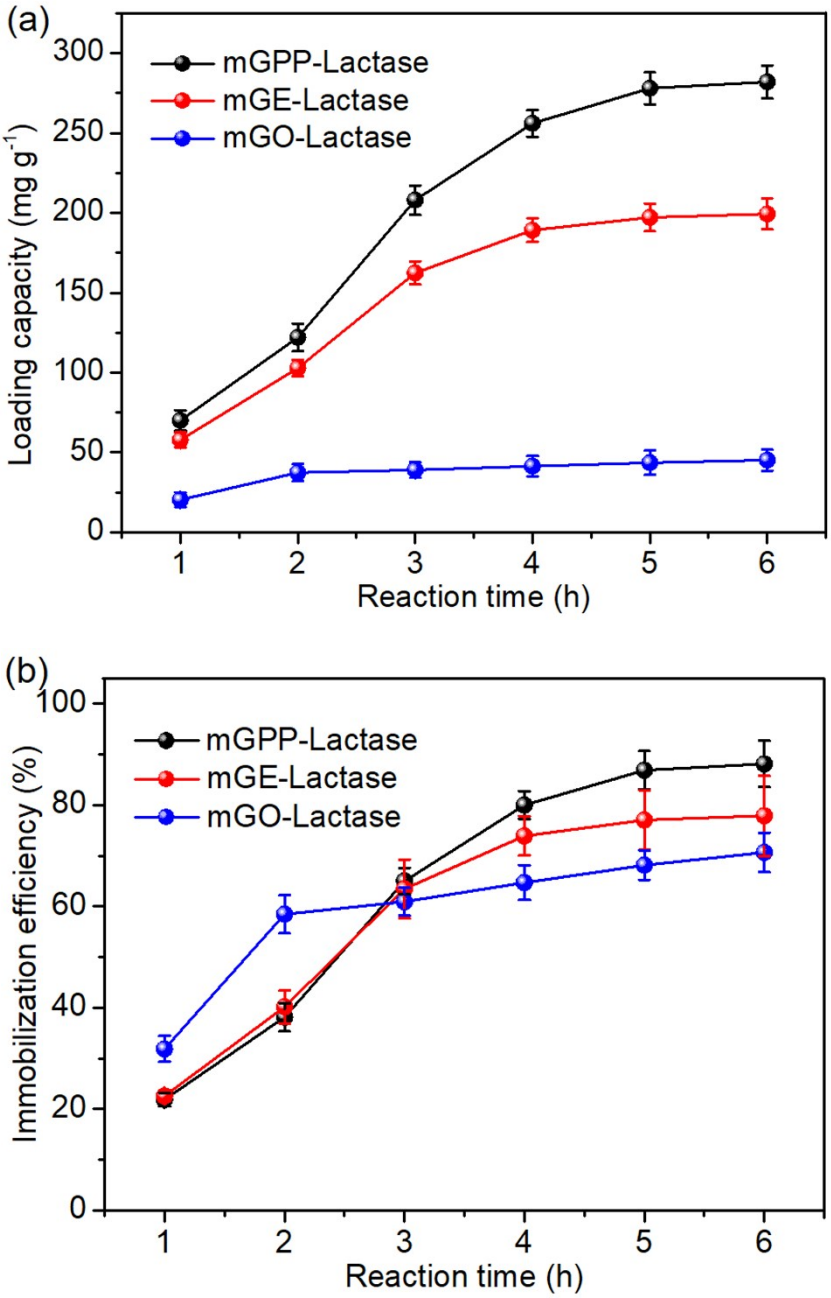

Fig. S7 (a) Effect of reaction time on loading capacities of mGO-Lactase, mGE-Lactase, and mGPP-Lactase, (b) effect of reaction time on immobilization efficiencies of mGO-Lactase, mGE-Lactase, and mGPP-Lactase.

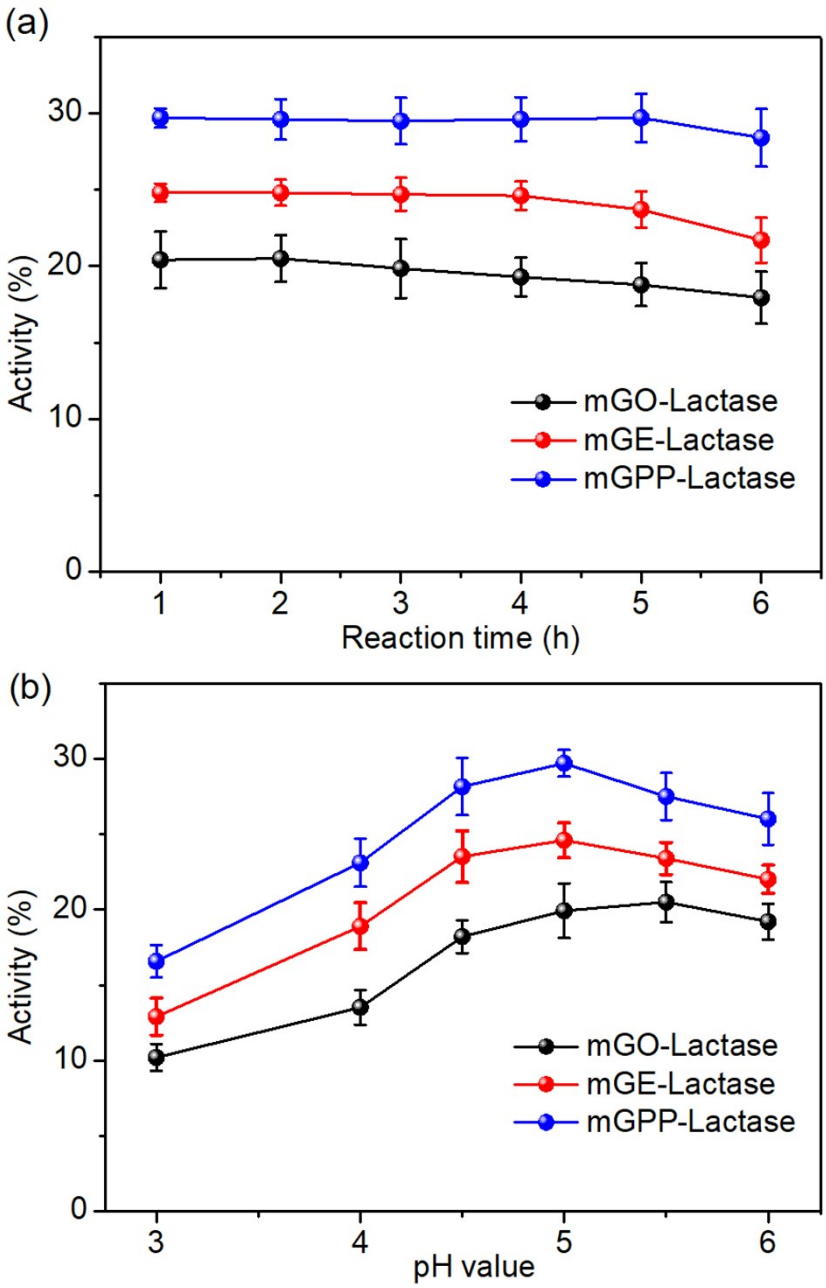

Fig. S8 (a) Effect of reaction time on activities of mGO-Lactase, mGE-Lactase, and mGPP-Lactase, the invariant pH value is 5.0, (b) effect of pH condition on activities of mGO-Lactase, mGE-Lactase, and mGPP-Lactase, the invariant temperature is 30 ^{o}C.

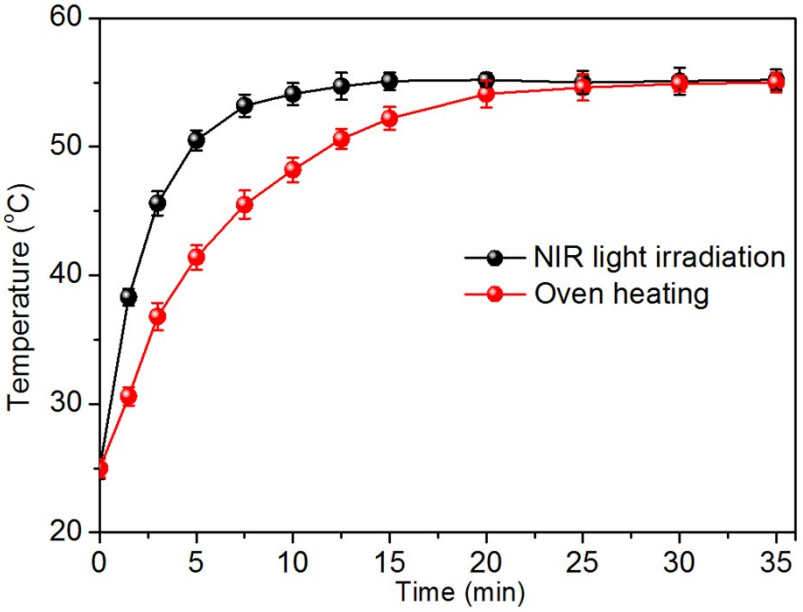

Fig. S9 The temperature change curves of mGPP-Lactase aqueous solution in the case of NIR light irradiation or external heating (heat oven) approach.

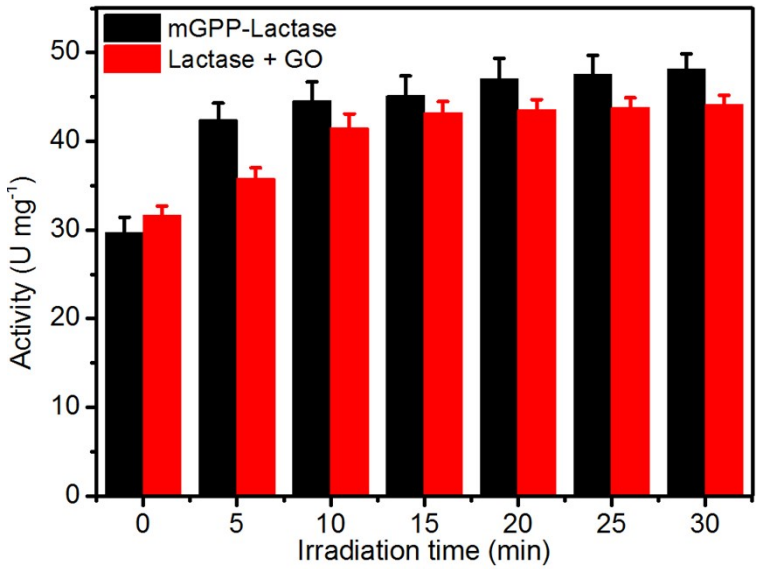

Fig. S10 Activities of mGPP and free lactase (in the presence of GO) under NIR light irradiation for different times.