# Production of bioethanol from lignocellulosic biomass using enzyme mimicking nanomaterials

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A cost-effective, simple, and rapid method for converting raw corn cob into bioethanol using enzymes mimicking cerium-doped iron oxide nanoparticles ($CeFe_3O_4$-NPs) without any pretreatment has been developed. $CeFe_3O_4$-NPs with exceptional laccase and cellulase/hemicellulase mimicking properties were used for the simultaneous pretreatment (i.e., delignification) and saccharification of corn cob biomass. Raw corn cob biomass was converted into C6 and C5 sugars using $CeFe_3O_4$-NPs along with in-house produced cellulase and hemicellulase enzymes, achieving maximum glucose (20.3 ± 1.01 g/L) and xylose (22.0 ± 2.22 g/L) within 24 h of hydrolysis at 55 ºC. Additionally, 21.7 g/L of bioethanol was produced by *Saccharomyces cerevisiae*. Notably, the presence of $CeFe_3O_4$-NPs facilitated xylose utilization in *S. cerevisiae*. Owing to magnetic properties, $CeFe_3O_4$-NPs can be recovered after hydrolysis and reused for the next set of experiments. The overall results obtained strongly demonstrate that the combination of $CeFe_3O_4$-NPs with enzymes can be a promising tool for converting lignocellulosic biomass into biofuels.