Highly active kenaf bio-cellulose based poly (hydroxamic acid) copper catalyst for Aza-Michael addition and click reactions

ABSTRACT

Bio-heterogeneous kenaf cellulose supported poly(hydroxamic acid) Cu(II) complex and corresponding copper nanoparticles (**CuN@PHA**) were synthesized and characterized. Cellulose supported poly(hydroxamic acid) copper nanoparticles was successfully applied to the Aza-Michael addition reaction of amines with α,β-unsaturated carbonyl/cyano compounds and poly(hydroxamic acid) Cu(II) complex was applied to the Click reactions of organic azides with alkynes in presence of sodium ascorbate as highly active catalysts under mild reaction conditions. The copper nanoparticles (50 mol ppm) selectively boosted Aza-Michael addition reaction to give the corresponding alkylated products in up to 96 % yield, whereas poly(hydroxamic acid) Cu(II) complex (0.25 mol%) efficiently promoted Click reaction to give the corresponding 1,2,3-triazoles in up to 94 % yields. Excellent reusability of the supported copper catalysts were found with no significant loss of catalytic activity for several cycles having high turnover number (TON) 18000 and turnover frequency (TOF) 3000 h^{-1} in the Aza-Michael addition reaction.