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Catalysis by Copper Derivatives in Substitution and Addition Reactions

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In this presentation two types of processes will be considered.

1. Cross-coupling reactions of carbon-carbon and carbon-heteroatom bond formation (including the reactions of C-H activation)

2. The addition of S-H, Se-H, P-H, H-H bonds to alkynes, alkenes and imines (including asymmetric Friedel-Crafts/Michael addition reactions).

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Surface Derivatization of Zirconium Phosphate Nanoplatelets: Potential Nanocarrier of Doxorubicin Anticancer Drug

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Surface modification of doxorubicin anticancer drug (DOX) intercalated zirconium phosphate (ZrP) nanoparticles (DOX@ZrP) is proposed to improve the potential of this drug delivery system for cancer therapy. The surface of DOX@ZrP nanoparticles was modified with an amorphous layer of Zr(IV) followed by modification with monomethyl-polyethylene glycol-monophosphate (m-PEG-PO3) to increase the DOX@ZrP biocompatibility. $^{31}P\{^{1}H\}$MAS NMR data shows a new peak at -26 ppm corresponding to the PO_4^{3-} groups coordinated with Zr(IV) on the surface. m-PEG-PO_3/Zr(IV)/DOX@ZrP spectra shows no additional resonance centered at δ of -22.6 ppm generated by proton-phosphorous cross polarization indicating no partial PEG intercalation in the interlaminar space. Simulated body fluid (SBF) was used to determine the *in vitro* release of DOX from DOX@ZrP, Zr(IV)/DOX@ZrP, and m-PEG-PO_3/ Zr(IV)/DOX@ZrP. MTS cell viability assay reveal that m-PEG-PO_3/ Zr(IV)/DOX@ZrP exhibited a 20% increase in the toxicity comparing with free DOX when PC3 cells are exposed for 48 h. m-PEG-PO3 polymer coating of DOX@ZrP nanoparticles promise to have a strong impact on the targeting, distribution and degradation of the nanoparticles under physiological environment that should result in a more efficient chemotherapy agent than free doxorubicin.

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