

8 Summary

In the present thesis synthesis and catalytic application of different organically functionalized mesoporous materials have been thoroughly described in different chapters. Post synthesis and in-situ synthesis both the techniques have been adopted to develop the organic-inorganic hybrid mesoporous materials. Furfural imine functionalized mesoporous silica has been synthesized by using CTAB as structure directing agent by applying in-situ grafting technique. This furfural imine functionalized mesoporous SBA-15 has been also developed by employing post-grafting approach. Then these two different mesoporous materials have been subjected to react with $\text{Cu}(\text{OAc})_2$ to deliver Cu-grafted mesoporous organosilica. After Cu grafting different crystalline phases have been generated for the two different mesoporous silica materials. Also In another case $-\text{NH}_2$ functionalized mesoporous organosilica has been developed by applying in-situ grafting technique. Surface of mesoporous SBA-15 has been functionalized by reaction with 3-aminopropyltriethoxy silane. Then $-\text{CO}_2\text{H}$ functionalized mesoporous SBA-15 has been synthesized by applying Schiff-base condensation reaction. Fe_3O_4 nanoparticle has been grafted into the mesopore channel of cysteine functionalized mesoporous SBA-15 material. Thiol-ene click chemistry has been adopted to prepare cysteine functionalized mesoporous SBA-15 material. All the above materials have been well characterized by Powder X-ray Diffraction (PXRD), High Resolution Transmission Electron Microscope (HRTEM), Field Emission Scanning Electron Microscope (FESEM), N_2 adsorption-desorption study, Fourier Transform Infrared Spectroscopy (FT IR), Ultra Violet Visible Diffuse Reflectance Spectroscopy (UV-Vis DRS), EPR analysis, Thermo-Gravimetric-Differential Thermal Analysis (TG-DTA) and solid state ^{29}Si and ^{13}C NMR analysis. These functionalized mesoporous materials have been utilized in various coupling reaction (C-S coupling), one-pot condensation (Biginelli condensation), one-

pot thioetherification, Knoevenagel condensation reaction. Cu-grafted mesoporous material has been used for C-S coupling reaction. Beside this Cu-grafted furfural imine functionalized mesoporous SBA-15 has been employed for three component one-pot thioetherification reaction. Biginelli condensation reaction was carried out by using Fe_3O_4 grafted mesoporous SBA-15 material. $-\text{NH}_2$ functionalized mesoporous silica has been employed for performing Knoevenagel condensation reaction.