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Optimization of process parameters by using Taguchi method for bainitic steel machining

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In recent days, bainitic steel is used in automobile and non-automobile sectors due to its high strength. Bainitic steel is difficult to machine because of its high hardness, hence in this paper machinability of bainitic steel is studied by using Taguchi design of experiments (DOE) approach. Convectional turning experiments were done by using L16 orthogonal array for three input parameters viz. cutting speed, depth of cut and feed. The Taguchi method is applied to study the performance characteristics of machining parameters with surface roughness (Ra), cutting force and tool wear rate. By using Taguchi analysis, optimized process parameters for best surface finish and minimum cutting forces were analyzed.

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A facile method for synthesis of novel bifunctional mesoporous silica catalyst and its catalytic evaluation in one-pot deacetalization-Knoevenagel reaction

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Bifunctional (both sulfonic and amine) functionalized mesoporous silica catalyst was prepared by a hydrothermal method using silane(3-[2-(2-amino ethyl amino) ethyl amino] propyl trimethoxysilane (AEPTMS)) and (3-Mercaptopropyl) trimethoxysilane. The material was fully characterized by BET surface area analysis, X-ray diffraction, 29Si CPMAS-NMR, Fourier-transfer infrared spectroscopy (FTIR), X-ray photoelectron spectra (XPS) and Scanning electron microscope (SEM). FTIR and NMR results revealed the successful grafting of organic amines and sulfonic group onto the surface of silica. Clear evidence between N and S confirmed from the XPS1. The bifunctional catalyst having both acid and base functions enhanced the reactivity of substrate. The catalytic activity was explored for liquid phase one-pot deacetalization-Knoevenagel reaction. The bifunctional catalyst showed excellent yield (95%) of products. Recycle of the catalyst was examined by carrying out repeat runs on the same batch reaction. The yield decreased by 5.7% in the regenerated sample in the fourth cycle.

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