ABSTRACT

Biologically active thiourea derivatives containing benzothiazole, thiazole, and pyrimidine moieties (**5a-t**, **10a-d**, **15a-e**, **20a-p** & **25a-k**) were successfully synthesized by using tetrabutyammonium bromide (TBAB) as phase transfer catalyst (PTC). Complexes of selected thiourea ligands with Ni(II) and Cu(II) metals (**30a-n**, **35a-n**) were synthesized in ethanol at room temperature. The nature of these ligands and complexes were evaluated on the basis of spectroscopic and analytical techniques such as FTIR, NMR, Mass spectrometry (MS-APCI), elemental analysis and their molecular structures were determined by X-ray single crystal analysis. Thermogravimetric analysis (TGA) was carried out in-order to study relative thermal stabilities and decomposition patterns of the complexes. Thiourea ligands bearing the thiazole, benzothiazole and pyrimidine moieties were screened for antimicrobial activity by micro-dilution method and food poisoned technique against some pathogenic bacteria and fungi respectively. A series of thiourea ligands containing benzothiazole moiety were also screened for anticancer studies.

The nickel and copper complexes (**30a-f**, **30k**, **35a-f**, **35h**, **35j** and **35k**) were used as single source precursors for the deposition of nickel and copper sulfide thin films by AACVD. The nanoparticles and nanocrystals were synthesized from metal complexes (**30a, 30c-e, 35c-d, 35h** and **35j**) by colloidal thermolysis method. The effect of alkyl groups, coordinating atoms, deposition temperatures on phases and morphology of the films were studied. The deposited films were characterized by powder X-ray diffraction (p-XRD), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX), and atomic force microscopy (AFM). The deposited thin films were found to have good adhesion, no cracks and to be crystalline in nature without any impurities. The synthesized nanoparticles and nanocrystals were characterized by powder X-ray diffraction (p-XRD) and transmission electron microscopy (TEM).

Thiourea metal complexes containing amino functionalities (**30n** and **35n**) were used as curing agents for epoxy resins. The reaction between complexes and epoxy resin was monitored by FTIR spectroscopy. Thermal properties of the metal-containing epoxy polymers were investigated by thermogravimetric analysis (TGA) and differential scanning calorimetery (DSC). Visco-elastic behavior of polymeric materials was studied by dynamic mechanical and thermal analysis (DMTA). Comparison of tensile and flexural properties of cured epoxy polymers with the commercially available DDM/DGEBA has been discussed.