

Nanocomposites and nanomaterials

Optimization synthesis of surface modified Cr:TiO₂ nanomaterials using Response Surface Methodology (RSM)

B. Shahmoradi¹, M. Pirsahab², A. Pordel¹

¹ *Kurdistan Environmental Health Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran*

² *Research Center for Environmental Determinants of Health (RCEDH), Kermanshah University of Medical Sciences, Kermanshah, Iran
E-mail: mpirsahab@yahoo.com*

There are different methods used for synthesis of doped nanomaterials, each having its merits and demerits. Selecting suitable method depends upon the desired properties of nanomaterials, precursors, economy, facilities, etc. Optimizing synthesis conditions of nanomaterials would reduce time wasting and energy consumption. This research paper aimed at optimizing synthesis conditions of Chromium oxide doped TiO₂ nanomaterials under mild hydrothermal conditions. The variable included were $t = 2-16$ hr, $T = 50-250$ °C, solvents (HCl, NaOH, KOH), dopant concentration (0.2-2 wt percentage), and surface modifier volume (0.2-1.5 ml). Using response surface methodology (Design Expert software Ver. 8.1), we designed our experiments under different abovementioned conditions. The number of runs was 32 runs. Different optimum conditions was achieved. Selecting optimum conditions depends upon the desired properties. For our work, we considered physical and some chemical properties of nanomaterials including SEM, EDAX, ATR-IR, Powder XRD, zeta potential, and UV-Vis spectrophotometry.

Keywords: RSM, nanomaterials, doping, surface modification, characterization, hydrothermal condition.