In this study, *Nitzschia* sp. algae biomass was modified with silica-magnetite using sol-gel method, and subsequently tested as adsorbent for Cd(II), Cu(II) and Pb(II) ions dissolved in water. Two adsorbents were prepared and specified as hybrid silica algae (HAS) and the hybrid algae silica-magnetite (HAS-M). The adsorbents were characterized using several techniques, include Infrared (IR) Spectroscopy for functionality analysis, X-ray diffraction (XRD) for structural analysis, Scanning Electron Microscope (SEM) for surface morphology analysis, and Energy Dispersive X-ray (EDX) Spectroscopy for elemental composition analysis. To investigate the adsorption capacity of the adsorbents, a series of adsorption experiments was conducted and the concentrations of the metal ions was determined using atomic absorption spectrophotometer (AAS). The results obtained revealed that the adsorbents were able to adsorb the metal ions up to 90%. In addition, it was found that the optimum conditions for the best results are pH 5 for Cu(II) and Pb(II), and pH 7 for Cd(II). The adsorption isotherm indicate that adsorption follows the Langmuir isotherm, with the $R^2 = 0.86 - 0.99$. The adsorption energies are in the range of 25.86 - 33.90, suggesting that the adsorption took place through chemical interaction between the metal ions and the adsorbents.

Keywords: adsorption, biomass *Nitzschia* sp., sol-gel, magnetite