

Metal-ion permeation in congested nanochannels: the exposure effect of Ag⁺ ions on the phosphorescent properties of a gold(I)-pyrazolate complex that is confined in the nanoscopic channels of mesoporous silica

Abstract:

An organometallic/silica nanocomposite of a 1D cylindrical assembly of a trinuclear gold(I)pyrazolate complex ([Au₃Pz₃]) that was confined inside the nanoscopic channels of hexagonal mesoporous silica ([Au₃Pz₃]/silicahex), emitted red light with a luminescence center at 693 nm upon photoexcitation at 276 nm owing to a Au^I–Au^I metallophilic interaction. When a film of [Au₃Pz₃]/silicahex was dipped into a solution of Ag⁺ in tetrahydrofuran (THF), the resulting nanocomposite material (Ag@[Au₃Pz₃]/silicahex) emitted green light with a new luminescence center at 486 nm, which was characteristic of a Au^I–Ag^I heterometallic interaction. Changes in the emission/excitation and XPS spectra of Ag@[Au₃Pz₃]/silicahex revealed that Ag⁺ ions permeated into the congested nanochannels of [Au₃Pz₃]/silicahex, which were filled with the cylindrical assembly of [Au₃Pz₃].