

Luminescent gold and silver complexes with the monophosphane 1-(PPh₂)-2-Me-C₂B₁₀H₁₀ and their conversion to gold micro- and superstructured materials

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Gold and silver complexes containing the monophosphane 1-PPh₂-2-Me-1,2-C₂B₁₀H₁₀ with different coordination numbers (2, 3) have been synthesized: [M(7,8-(PPh₂)-2-C₂B₉H₁₀)(1-PPh₂-2-Me-C₂B₁₀H₁₀)] (M = Ag, Au) and [Au₂(?-1,n-C₂B₁₀H₁₀)(1-PPh₂-2-Me-C₂B₁₀H₁₀)₂] (n = 2, 12). Solid-state pyrolysis of [AuCl(1-PPh₂-2-Me-C₂B₁₀H₁₀)] and [Au₂(?-1,12-C₂B₁₀H₁₀)(1-PPh₂-2-Me-C₂B₁₀H₁₀)₂] in air and of solutions of [AuCl(1-PPh₂-2-Me-C₂B₁₀H₁₀)] deposited on silicon and silica at 800 °C results in single-crystal Au, confirmed by diffraction and SEM-EDS. The morphology of the pyrolytic products depends on the thermolytic conditions, and different novel 3-D superstructures or microcrystals are possible. We also propose a mechanism for the thermal conversion of these precursors to structural crystalline and phase pure materials. The presence of the carborane monophosphane seems to originate quenching of the luminescence at room temperature in the complexes [Au₂(?-1,n-C₂B₁₀H₁₀)(1-PPh₂-2-Me-C₂B₁₀H₁₀)₂], in comparison with other [Au₂(?-1,n-C₂B₁₀H₁₀)L₂] species (L = monophosphane). © 2014 American Chemical Society.