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New heterometallic copper zinc alkoxides: synthesis, structure properties and pyrolysis to Cu/ZnO composites

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Abstract

The copper compound $[(THF)KCu(O^tBu)_3]_\infty$ **1** was obtained by interaction of a 1:1 mixture of $ZnCl_2/CuCl_2$ with KO^tBu. Bi- and trifunctional aminoalcohols were used to synthesize the intramolecularly donor stabilized Cu(II) alkoxides $Cu(OCH(R)CH_2NMe_2)_2$ (**3**: R = Me, **4**: = CH_2NMe_2) where **4** was structurally characterized. Lewis acid–base adduct formation with $(Me_3Si)_3CZnCl$ gave the heterodinuclear compounds $(Me_3Si)_3CZnCl \cdot Cu(OCH(R)CH_2NMe_2)_2$ (**5**: R = Me, **6**: R = CH_2NMe_2), which were characterized by X-ray single-crystal structure analysis. The two metal centers Cu and Zn of **5** and **6** are bridged by two oxygen atoms to form a Cu–O–Zn core. Pyrolysis of compounds **5** and **6** in dry argon or a H_2/N_2 mixture at atmospheric pressure forms metallic copper and zinc oxide, whereas pyrolysis under O_2/Ar forms additionally oxidized copper species. Elemental analysis of the pyrolysis products showed carbon and nitrogen contamination. Scanning electron microscopy and energy dispersive X-ray analysis were performed to get information on the morphology and the chemical composition of the pyrolysis products.

Keywords: copper; heterometallic alkoxides; oxides; pyrolysis; zinc