

On the synthesis of doubly bridged cluster complexes with up to four different core metal atoms starting with educts of the type $\text{MM}'(\mu\text{-H})(\mu\text{-PR}_2)(\text{CO})_8$
($\text{MM}' = \text{Mn}_2, \text{MnRe, Re}_2$; $\text{Y} = \text{H, PR}_2$; $\text{R} = \text{organic residue}$)

This Ph. D. thesis describes the development of synthetic routes for a systematic build up of doubly bridged cluster complexes with two to four different core metal atoms $\text{M}^1\text{M}^2(\text{M}^3\text{L})(\text{M}^4\text{L})(\mu\text{-Y})(\mu\text{-PR}_2)(\text{CO})_6$.

Doubly phosphido bridged metallatetrahedrane of the type $\text{M}^1\text{M}^2(\text{M}^3\text{L})(\text{M}^4\text{L})(\mu\text{-PR}_2)(\mu\text{-Y})(\text{CO})_6$ were synthesized in four steps starting from $\text{M}^1\text{M}^2(\mu\text{-H})(\mu\text{-PR}_2)(\text{CO})_8$. The following systems were obtained: a) $\text{M}^1 = \text{M}^2 = \text{Re}$: $\text{R} = \text{Cy, Ph}$; $\text{Y} = \text{PPh}_2, \text{PCy}_2, \text{PEt}_2$; $\text{M}^3\text{L} = \text{AuPR}_3$; $\text{M}^4\text{L} = \text{AuPR}_3$, AgPR_3 ; $\text{R}' = \text{Cy, Ph, Et}$. b) $\text{M}^1 = \text{Mn, M}^2 = \text{Re}$: $\text{R} = \text{Cy}$; $\text{Y} = \text{PPh}_2$; $\text{M}^3\text{L} = \text{M}^4\text{L} = \text{AuPPh}_3$. The synthesis of metallatetrahedrane with four different metal atoms was successful in the case of phosphido and acyl bridged cluster complexes like e.g. $\text{MnRe}(\text{AuPPh}_3)(\text{HgMoCp}(\text{CO})_3)(\mu\text{-PCy}_2)(\mu\text{-C}(n\text{-Bu})\text{O})(\text{CO})_6$. This kind of cluster complexes is accessible in a three step synthesis. On trying to prepare a PH functionalized doubly phosphido bridged metallatetrahedran the novel cluster complexes $\text{M}^1\text{M}^2(\text{AuPR}_3)_2(\mu\text{-H})(\mu\text{-PCy}_2)(\mu_4\text{-PCy})(\text{CO})_6$ were obtained. They exhibit for $\text{M}^1 = \text{M}^2 = \text{Mn}$ or Re a fluctuating behaviour while the heteronuclear compound ($\text{M}^1 = \text{Mn, M}^2 = \text{Re}$) is structurally rigid.

Furthermore, the first preparations of gold(I) acylcomplexes $\text{Re}_2(\mu\text{-PR}_2)(\text{CO})_7(\text{OC}(\text{AuPR}_3)\text{R}''')$ [$\text{R} = \text{Ph, Et}$; $\text{R}' = \text{Ph, p-C}_6\text{H}_4\text{F, p-C}_6\text{H}_4\text{OMe, o-tolyl, Me, Et, i-Pr, Cy}$; $\text{R}''' = n\text{-Bu, t-Bu, Me, Ph, N}(i\text{-Pr})_2, \text{NCy}_2$] are reported. The acyl oxygen is co-ordinated to a Rhenium atom of the dirhenium complex. All attempts to isolate the free gold(I) acylcomplexes failed due to the labile Au-C bond.