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New Formamidinate Rare Earth Metal Complexes by Pseudo-Grignard Reaction

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Pseudo-Grignard reagents^{1, 2}, “ RLnX ” ($\text{Ln} = \text{Eu}, \text{Sm}$ and Yb ; $\text{R} = \text{Me}, \text{Ph}$ or $\text{C}_6\text{H}_2\text{Me}_3$ -2, 4, 6; $\text{X} = \text{Br}, \text{I}$), formed by the treatment of organic halides like PhBr or PhI with rare earth metals in Lewis base solvents, can be employed to various organic or inorganic transformations^{3, 4}. We now report the synthesis of new divalent rare earth metal formamidinate complex $[\text{Ln}(\text{Form})\text{Br}(\text{thf})_2]_2$ through the relevant Pseudo-Grignard reactions of rare earth metal with bromobenzene in the presence of formamidine (Eq. 1).

A typical reaction using ytterbium metal and bromobenzene or iodobenzene in the presence of 2,4,6-methylformamidine led to the isolation of orange and light orange complexes $[\text{Yb}(\text{Form})\text{Br}(\text{thf})_2]_2$, $[\text{Yb}(\text{Form})\text{I}(\text{thf})_2]_2$. The product has been structurally characterized including X-ray crystallography (Fig. 1).

Fig. 1. Molecular structure of $[\text{Yb}(\text{Form})\text{Br}(\text{thf})_2]_2$

Fig. 2. Molecular structure of $[\text{Yb}(\text{Form})\text{I}(\text{thf})_2]_2$

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