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TITLE: Bio-inspired copper complexes catalysts for N_2O activation

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ABSTRACT BODY:

Abstract Body: Nitrous oxide (N_2O) is a toxic compound from an environmental point of view, because it is an ozone-depleting substance and an efficient greenhouse gas.(1) Levels of N_2O in the atmosphere continue to rise, due in large part to anthropogenic sources. This has stimulated much interest in developing and understanding its decomposition, particularly through the use of transition metal catalysts. In nature, conversion of N_2O to N_2 is catalysed under ambient conditions by the metalloenzyme nitrous oxide reductase (N_2OR) .(2)

Previous structural and theoretical studies identify the active site of N_2OR as a unique μ-sulfido-tetracopper center (Cuz) and a proposed mechanism, with a bent μ-1,3-binding coordination mode of N_2O on two copper centre has been proposed.(3) To date, the only example of a copper-containing compound capable of reducing N_2O, is the bio-inspired, mixed-valent tricopper-disulfido cluster reported by the Tolman's group.(4)

Herein, we report the synthesis of novel binuclear copper complexes, along with reactivity studies of [2.(CF_3SO_3)] which reduce N_2O. These compounds contain a thiophenolate ligand with N-coordinating atoms,and have been synthetized *via* an original method.(5)

These new species have been characterized spectroscopically and contain a $\{Cu_2S\}^{[2+]}$ Mixed-Valent motif, the valence delocalization depending on the organic skeleton. A striking Cu-Cu bonding interaction has been pointed out and confronted with calculations. The reactivity toward N_2O depends of the presence of a vacant site, which indicates the potential fixation of this poor coordinating substrate.

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