

# Copper(I) complexes supported by a heavily fluorinated bis(pyrazolyl)borate: syntheses and characterization of $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{CuL}$ (where $\text{L} = \text{PPh}_3, \text{N}\equiv\text{CCH}_3, \text{HC}\equiv\text{CPh}, \text{H}_2\text{C}=\text{CHPh}$ ) and $\{[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}\}_2(1,5\text{-COD})$

H.V. Rasika Dias <sup>a,b,\*</sup>, Sharon A. Richey <sup>a</sup>, Himashinie V.K. Diyabalanage <sup>a</sup>,  
Jose Thankamani <sup>a</sup>

<sup>a</sup> Department of Chemistry and Biochemistry, The University of Texas at Arlington, PO Box 19065, Arlington, TX 76019-0065, USA

<sup>b</sup> Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka

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## Abstract

The fluorinated bis(pyrazolyl)borate  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]^-$  allows the isolation of thermally stable copper(I) complexes containing phosphorus and nitrogen based donors, alkyne and alkene ligands.  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}(\text{PPh}_3)$ ,  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}(\text{NCCH}_3)$  and  $\{[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}\}_2(1,5\text{-COD})$  were synthesized by using  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{K}$ ,  $\text{CF}_3\text{SO}_3\text{Cu}$ , and the appropriate ligand,  $\text{PPh}_3$ ,  $\text{NCCH}_3$  or  $1,5\text{-COD}$ .  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}(\text{HC}\equiv\text{CPh})$  and  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}(\text{H}_2\text{C}=\text{CHPh})$  were obtained by treating  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}(\text{NCCH}_3)$  with phenylacetylene and styrene, respectively. X-ray data show that  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{CuL}$  (where  $\text{L} = \text{PPh}_3, \text{HC}\equiv\text{CPh}, \text{H}_2\text{C}=\text{CHPh}$ ) and  $\{[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}\}_2(1,5\text{-COD})$  have three-coordinate, trigonal planar copper sites. The bis(pyrazolyl)borate moiety adopts the common boat conformation. The  $\nu_{\text{C}\equiv\text{C}}$  stretching band of  $[\text{H}_2\text{B}(3,5\text{-(CF}_3)_2\text{Pz)}_2]\text{Cu}(\text{PhC}\equiv\text{CH})$  was observed at  $1927\text{ cm}^{-1}$ . Structural and spectroscopic data of the alkene and alkyne complexes indicate minimal back-bonding from the  $d^{10}$  copper(I) center.

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**Keywords:** Copper; Bis(pyrazolyl)borate; Fluorinated; Alkene; Alkyne

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