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Bite-Angle-Regulated Coordination Geometries:Tetrahedral and Trigonal Bipyramidalin M(II) (M = Ni, Co, Cu)Complexes with Biphenyl Appended N,N'-Bidentate Ligands

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Control of low coordinate and low-valent mononuclear transition metal-ion (Fe, Mn, Ni and Cu) complexes with modified classical bidentate and tridentate nitrogen ligands has attracted tremendous recent attention. They model the active-sites of metalloproteins involved in activation and catalysis of small molecules, O_2, H_2 and NO and aid in design of molecules with large magnetic anisotropy, as single molecule magnets (SMM). Previously, we reported that copper complexes with simple biphenyl-appended (2-pyridylmethyl)amine N,N'-bidentate ligand, activate O_2, facilitate P-O bond cleavage of phosphodiester and assemble pyrophosphate-bridged Cu(II)-hexamer, Cu_6.

In a recent report, we demonstrated that analogous bidentate ligand shaving ethyl (L^e) and methyl (L^m) alkyl spacers between the two donor atoms, control coordination geometries of M^{II}-halide (M = Ni, Co) complexes. L^e, with wide bite-angle (100°) stabilized four-coordinate, $[L^eMX_2]$ complexes with tetrahedral geometry; while, L^m with narrow bite-angle (80°) provided five-coordinate complexes, $[(L^m)_2MX](ClO_4^-)$ with trigonal bipyramidal geometry. Results of these investigations, including X-ray crystal structure, spectroscopy (UV-Vis-NIR, paramagnetic 1H NMR) and magnetism of high-spin Ni(II) and Co(II) are described.

Biography:

Prof. Murthy earned a Ph.D. degree in Inorganic Chemistry from Indian Institute of Science, Bangalore, India, in 1990. He was awarded J.C. Ghosh medal for best Ph.D. thesis work on multinuclear copper complexes with heteroallenes. He pursued postdoctoral research with Prof. Kenneth D. Karlin at the Johns Hopkins University, Baltimore, U.S.A. from 1990-92 and worked on in bioinorganic chemistry of copper. He continued there as a staff Research Scientist from 1992-96. In 1997, he joined Indian Institute of Technology, Madras, India, as Assistant Professor of Chemistry. He has been Professor since 2010. He was a visiting faculty at Johns Hopkins from 2003-04. He has taught and guided several Ph.D., Master's and undergraduate Engineering students.