Synthesis, Crystal Structures and Dielectric Properties of the Novel Linear High k Molecular Materials

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The crystal structures of the novel copper and iron complexes: dinitrate-aquadi-µ-hydroxobis-µ-(isonicotinato)copper(II) 'C12 H18 Cu N4 O14', **1**, and dinitrate-di-µ-hydroxobis-µ-(nicotinato)copper(II) 'C12 H14 Cu N4 O12', **2**, nitrate-diaquadi-µ-hydroxobis-µ-(nicotinato)copper(II),**3**,

 μ -(nicotinato)copper(II)hexafluoroacetylacetonate 4, tetranitrateand tetranitratediaquadi-µ-oxobis-µ-(isonicotinato) iron(III),6, diaquadi-µ-oxobis-µ-(nicotinato)iron(III) (C24 H40 Fe4 N4 O20 $8(NO_3)$ $2(H_2O)$, 7, and dielectric properties for 1, 2, 4, 6 and 7 are reported. 1, 4, 6 and 7 crystallize in the monoclinic crystal system in space group $P2_1/c$. 2 crystallizes in the triclinic crystal system in space group P 1. 3 crystallizes in orthorhombic system, space group Pbca. The molecules of 1 and 2 are arranged in quasi-1D chains perpendicular to the *a*-axis. **3** and **4** are 2-D polymers lying perpendicular to the *c*- and *a*-axis respectively. The molecules 6 and 7 are arranged in layers along the a-axis. The studied samples show a linear dielectric behavior characterized by a high dielectric permittivity, which is attributed to displacements of ionic bonds in the molecules. The ionic-bonds show characteristic dielectric resonance in the range of few kHz. The high dielectric permittivity and low ac conductivity make these materials attractive for high-k dielectric applications.

Keywords: high k linear molecular materials, cf and cv measurements, dielectro-structural correlation