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Investigating mixtures of rotor molecules and liquid crystals by dielectric spectroscopy and optical microscopy DEBRA KRAUSE, CHARLES T. ROGERS, Dept. of Physics, University of Colorado, Boulder, JOSE E. NUNEZ, MIGUEL GARCIA-GARIBAY, Dept. of Chemistry and Biochemistry, University of California, Los Angeles — Rotor molecules are fundamental in nanotechnology. These molecules are synthesized with one part of the molecule designed to freely rotate while other parts are attached to a surface or within a crystalline super-structure. One class of rotor molecules have fluorobenzene rotors surrounded by bulky triphenyl groups. Studies of these electric dipole rotors in a crystalline state have shown that steric interactions between neighboring molecules can result in large energy barriers (up to 21 kcal/mol) that inhibit motion of the rotor. In an effort to free the rotor but maintain degrees of order in position and orientation, we mix these molecules with liquid crystals, particularly those based on benzylidene-(4-phenylazo-phenyl)-amine. The rotor molecules can dissolve in these liquid crystals into solutions of up to 20 percent by mass. To characterize the environment of the rotor, we study the mixtures using dielectric spectroscopy and optical microscopy.

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