

# Organic Ferromagnetism: Its Possibility and Reality

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Ferromagnetic organic material is one of the so-called 'metal like' organic compounds, which can be approached by providing the ferromagnetic interaction among the magnetic moments. The magnetic moments in material result from the magnetic moments of unpaired electrons. Since the electron spin in organic molecules and molecular assemblies have a tendency to pair off, the specific molecular design is necessary to maintain the spin-multiplicity. A few proposed theoretical models for the organic ferromagnets are based on the mechanism of spin polarization, large alternating hydrocarbons, magnetic superexchange of  $\pi$ -electrons and charge-transfer-complex. Recently, several organic or polymeric compounds which show the spin-multiplicity and ferromagnetic behavior have been reported. However the problems of reproductivity and increasing the ferromagnetic portion remains still unsolved.

Nitroxyl and nitronyl nitroxide free radicals are both stable radicals at room temperature. Nitroxyl radicals(TEMPO) were combined with squaric acid or its derivatives to give four diradical compounds. Several nitronyl nitroxide radicals(TINNO) which have polymerizable functional groups were synthesized. For the all compounds, the magnetic properties were analyzed. A strong intermolecular ferromagnetic coupling was found in the case of a nitronyl nitroxide triradical compound(BZ-3TINNO). It is assumed that this ferromagnetic coupling results from the intermolecular spin polarization.

