# Dopant Catalyzed Charge Dissipation In A Liquid Crystal

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Palladium and lipoic acid have been combined in 1:1 stoichiometry to form a liquid crystal polymer complex (PLA). PLA is an investigative chemotherapy compound which transfers charge to DNA (1,2). PLA dries to form a fern pattern (fig.1), and undergoes a geometric transform from magnetic fields introduced during drying (Freedericks transition)(fig.2). PLA was synthesized in its 1:1 core form for this study, without addition of co-reactants used in its clinical formulation. The PLA is studied by a modification of electronic impedance spectroscopy in which controlled charge dissipation is allowed at the threshold of electrode polarization. This attempts to simulate the ion streaming in cell membranes which accompanies biologic oscillatory depolarization and repolarization, best studied in cardiac and nerve tissue. Alkaline PLA (pH range from 7.3 to 12.3) at .04 M, calculated as monomer, is diluted with de-ionized water. The PLA contains NaCl from the method of synthesis, and no additional background electrolyte is necessary. The diluted PLA is analyzed in an Ecochemie Autolab electro-chemistry system using a PAR mercury electrode stand. Impedance spectroscopy is performed at mercury oxidation threshold voltages to locate this boundary condition. A log series of 49 frequencies from 1 KHz to 50 mHz is scanned with 5 mv perturbations. Within 10 mv. bands, in a range from +.01 to +.38 V as a function of pH, EIS produces a conventional capacitive segment followed by a large counter-clockwise (reverse) curvature extending into the upper left quadrant of the complex plane (+.01 V: fig.3). The counter-clockwise curve has a smooth circle fit. An equivalent circuit– R1(Q1<R2-W1>)is expressed. A convergence to negative DC resistance, appears to be a discharge of a capacitive layer. The narrow voltage band is thought to limit the electrode corrosion to a small amount of Hg+1, which acts as a dopant hole in the PLA liquid crystal. The magnitude of the charge dissipation (current reversal), is correlated with the movement of both electrons and cation holes, a condition which has been called ambipolar and modeled in depth (3).
This catalytic charge transfer in a liquid crystal is a new paradigm in cancer chemotherapy.

**References**

**1.** Garnett,M., U.S.Patent No.5,463,093, Oct.31,1995.
**2.** Garnett,M.,and Remo,J.L., Microfabricated Systems and Mems V, Proc., **2000-19**: 185-190, ECS, 2000.
**3.** Emiliani,V., Frova,A., Presilla,C., Superlattices and Microstructures, **20**: No.1,1-5,1996.

**Figures**

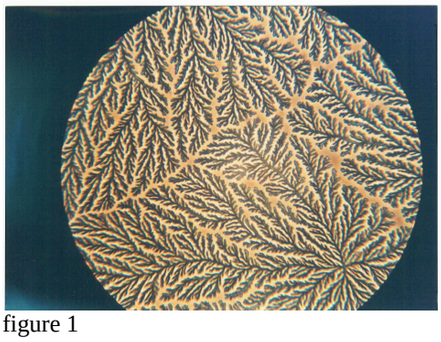
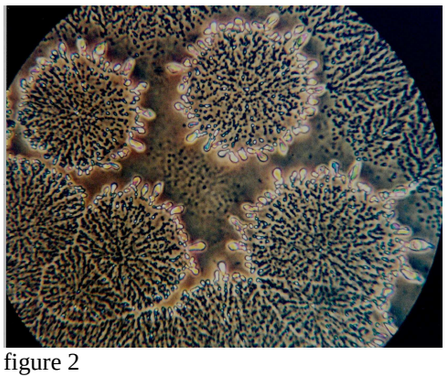


figure 1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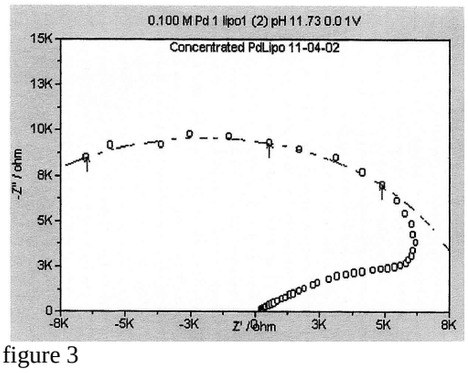

figure 3