200 Word Summary

The chief thrust of the research has been directed towards the evaluation of polyacetylene $(CH)_x$, the prototype conducting polymer as an electrode-active material in novel, rechargeable batteries employing non-aqueous electrolytes. The p-doped material, $[(CH^{+y})A_y^-]_x$, (where A^- is an anion) in conjunction with a Li anode, shows excellent discharge characteristics, e.g. very little change in discharge voltage with change in discharge current and a high power density. Its energy density is also good but it shows poor shelf life. When $(CH)_x$ is used as a cathode (Li anode), which results in the formation of the n-doped polymer, $[Li_y^+(CH^{-y})]_x$, during discharge, good discharge plateaus and power densities are obtained together with excellent shelf life and good recyclability. The energy density is, however only moderate. Cells employing a $[M_y^+(CH^{-y})]_x$ (where M = Li, Na) anode and a TiS_2 cathode show very good discharge and recycling characteristics but their energy density is poor. Work supported by this contract has been in large part responsible for five major companies world wide, embarking upon, and continuing an active R. and D. program on rechargeable batteries employing conducting polymers as one and/or both electrodes.