10 years from the first laboratory discovery of the phenomenon on which it is based, it would be most surprising if a battery employing an electroactive polymer were already in production. Not only is new chemistry and electrochemistry involved, but also new engineering aspects concerning, for example, something as apparently simple as the method of attachment of an organic polymer to a current collector. A disadvantage of all polymer electrodes is that they will, in general, be expected to exhibit smaller volumetric energy densities than conventional batteries since organic materials are usually less dense than metals and inorganic substances. To what extent this is a serious disadvantage will depend on the use to which the cell in which they are incorporated might be put.

Electrodes using polymers as electrode-active materials differ from conventional materials in that the polymer does not dissolve and is not re-deposited during charge/discharge cycles, although some swelling of the polymer does occur during oxidation or reduction. This absence of dissolution and redeposition is expected to promote longer life for polymer electrodes due to the absence of relatively large mechanical changes in electrode dimensions, etc., such as those observed with many conventional electrodes. Also, in most batteries, complete deep discharge leads to rapid deterioration. Hence, only partial utilization of the energy density of a battery can be achieved if it can only be partly discharged in order to prolong its effective operating life. The energy density of a polymer electrode, can, however, in many cases be completely utilized in repeated deep discharges at good discharge rates without adverse effects. For practical use this may in many instances compensate for the smaller gravometric and/or volumetric energy density of polymer batteries as compared to some conventional rechargeable batteries. If the charge/discharge cycles are held between potentials such that the polymer always retains sufficient conductivity to permit appropriately rapid charging and discharging,