Figure 1. By their chemical natures, fuels tend to give up electrons, and oxygen tends to capture them. This tendency leads to a transfer of electrons from fuel to oxygen during combustion. In the fuel cell, the same process is made to proceed at two electrodes in more orderly fashion.

Electrons are given up by the fuel at the anode, flow through the external circuit where they can do work, and are captured by oxygen at the cathode. The circuit is completed by the flow of ions through the electrolyte, which is virtually impervious to electrons. Note that the electrical transport resulting in work is a directed process throughout. This explains why the fuel cell escapes the Carnot-cycle limitation, which applies when heat energy (random) is converted into work (directed).

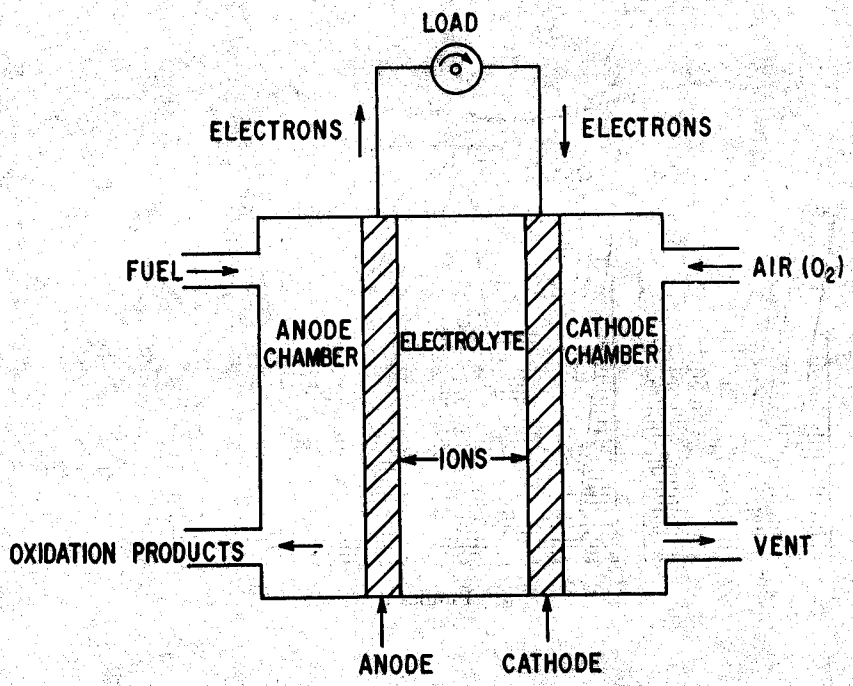

FIGURE 1