

An article about using tafel kinetics to evaluate an electrode material

[Science](#), [Chemistry](#)



Electro-Chem Using Tafel kinetics in evaluating electrode potential Through the experiment, the tries to demonstrate the required performance and durability of PEMFCs for engines. The author tries to showcase a simple and low cost method at which the amount of anti-knock platinum used in the cathode can be reduced. Since Current (I) demonstrations periods are greater than 0.5 gm/kW which translates to more than \$3600 platinum per vehicle, less expensive methods like this one are perfectly welcome.

Reducing the amount of platinum needed for anti-knock at the cathode is surely important to the economy.

By checking the exchange current density obtained by extrapolation to zero over potential depends on the Tafel-slope value used for extrapolation the author is able to choose his variables. This is because variations in Tafel-slope used for extrapolation could result in large deviations to occur in the intrinsic exchange current density for ORR. The amount of temperature in the oxygen reduction reaction has to be considered since temperatures above 70°C are difficult to operate in.

In this experiment, the set up made sure transport losses are minimum. For that to happen, the H⁺ was transported through the membrane and electrode whereas oxygen is transported through diffuse medium and electrode this is at an operational workplace of 100%RH and pure oxygen. By reducing the cathode platinum loading and the oxygen partial pressure in this experiment, low cell potential is attained.

The experiment was a not a success due to the many inconsistencies in the results. Despite of that, it was able to demonstrate the increased performance of the coverage dependent kinetics could be used instead of

constant Tafel-slope kinetics for performance in real life experiments. Details of how that will work are outside the scope of the experiment.