

**Using the Active Component Concentration  
Profile to Control High Power Charging of  
HEV Battery Pack**

Vladimir Pavlovic<sup>1</sup> and Robert Field<sup>1</sup>

<sup>1</sup>Edison Minit-Charger Technology Center  
2486 Dunwin Drive  
Mississauga, ON L5L 1J9  
Canada

In charging any Hybrid Electric Vehicle (HEV) battery pack it is mandatory to maximize the unwanted side reactions and maximize the charge return rate. To facilitate this a very accurate method of determining the battery's ability to store and convert energy is required. Adaptive feedback charge control is developed that is capable of responding to the active component concentration profile in the boundary layer near the plates.

During high power charging of a HEV Ni-MH battery pack, an elevated concentration gradient is initially created due to intense hydrogen absorption at the negative electrode when batteries are fully discharged. As the batteries become charged, the hydrogen absorption rate will decrease as the electrode equilibrium is shifting. Further charging results in the metal alloy reaching its hydrogen saturation point with the battery fully charged. A process method has been developed to detect and control the concentration gradient.