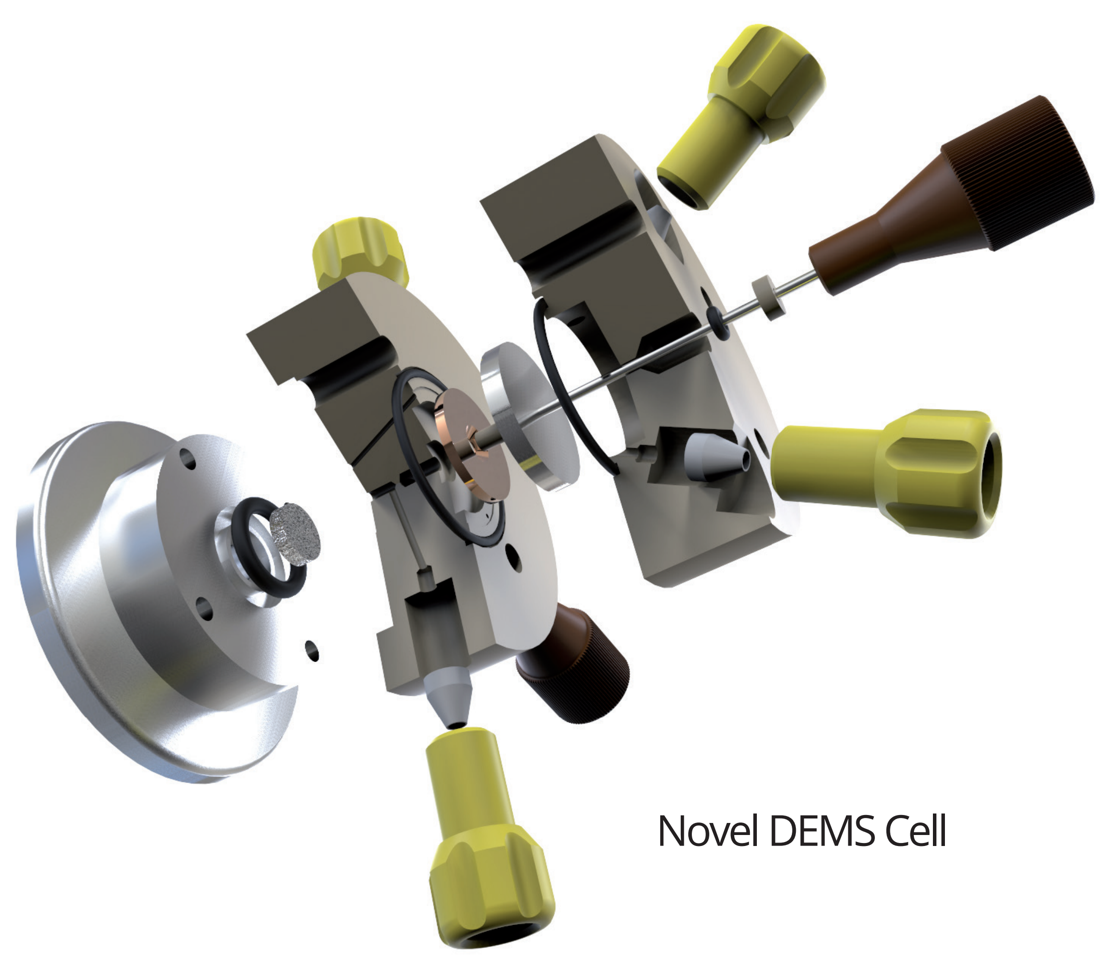
Mass spectrometers for vacuum, gas, plasma and surface science

Differential Electrochemical Mass Spectrometry (DEMS)

Solutions for dissolved gas analysis and off-gas analysis in electrochemistry

Hiden Analytical announce a new collaboration with The University of California, Berkeley Laboratory. With the new agreement Hiden Analytical manufactures and markets the novel Hiden DEMS mass spectrometer system with incorporation of the Berkeley-developed differential electrochemical cell. The new cell, developed by Ezra L. Clark and Prof. Alexis T. Bell of The University of California, Berkeley Laboratory, coupled with the Hiden differentially pumped mass spectrometer system, provides for in-situ mass resolved determination of gaseous or volatile electrochemical reaction intermediates and products in real-time.



Novel DEMS Cell

A novel differential electrochemical mass spectrometry (DEMS) cell for integration with the Hiden Analytical HPR-40 DSA membrane inlet mass spectrometer systems.

Hiden's gas analysers provide for multi-component, wide dynamic range real-time analysis of the key species involved in electrochemistry, hydrogen, oxygen, carbon dioxide and reaction products; ethanol for example.

A recent publication in Nature includes data from the Hiden MS: Jun Lu et al. (2016) *"A lithium–oxygen battery based on lithium superoxide"* Nature **378** (529), 377–382.

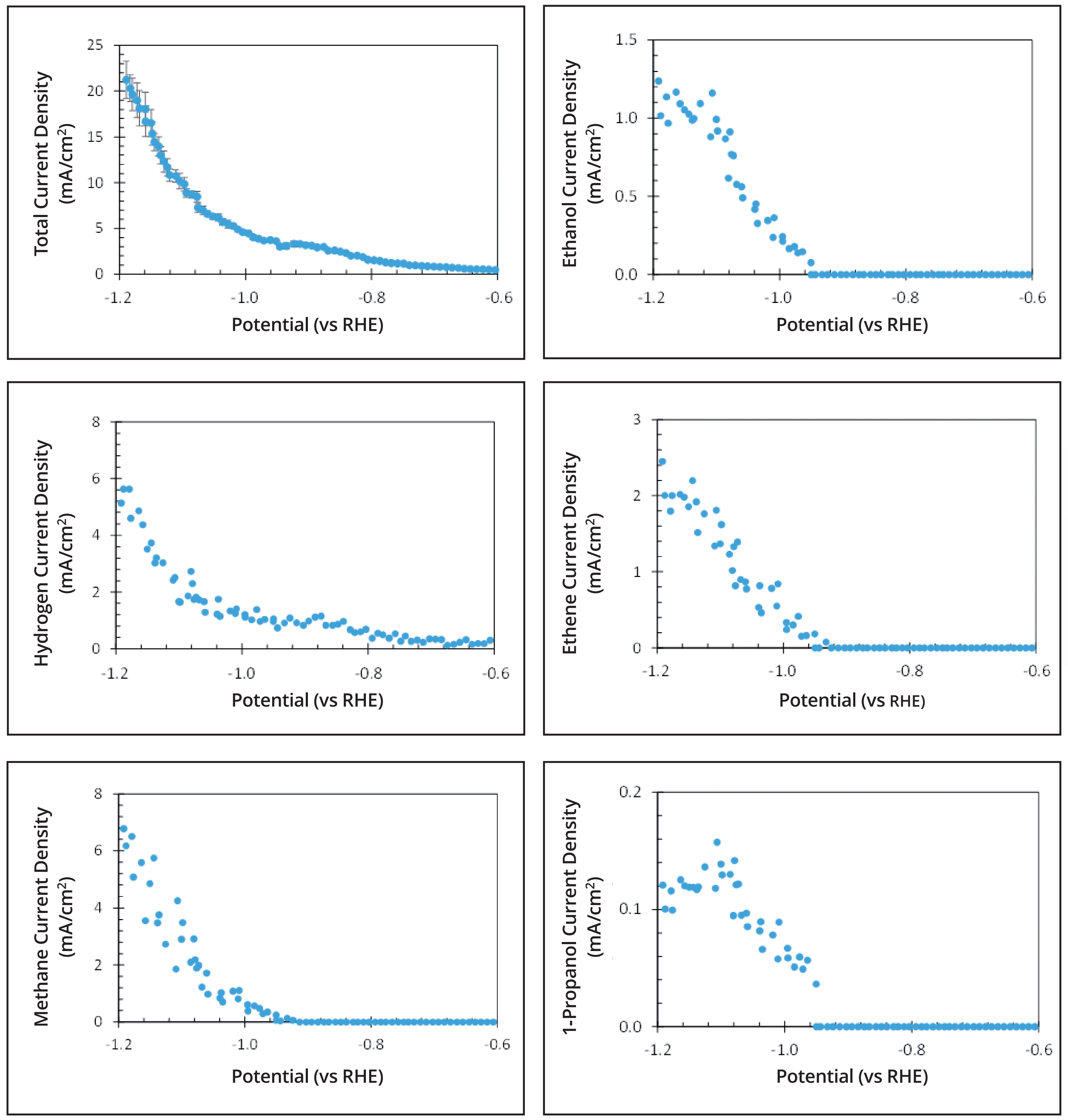


***Figure 1.** DEMS results obtained for CO_2-sparged 0.05 M K_2CO_3 electrolyte (pH = 6.8) with an electrolyte flow rate of 1 mL/min and a scan rate of 0.2 mV/s. Further details are included in the ACS publication.*

HPR-40 DEMS

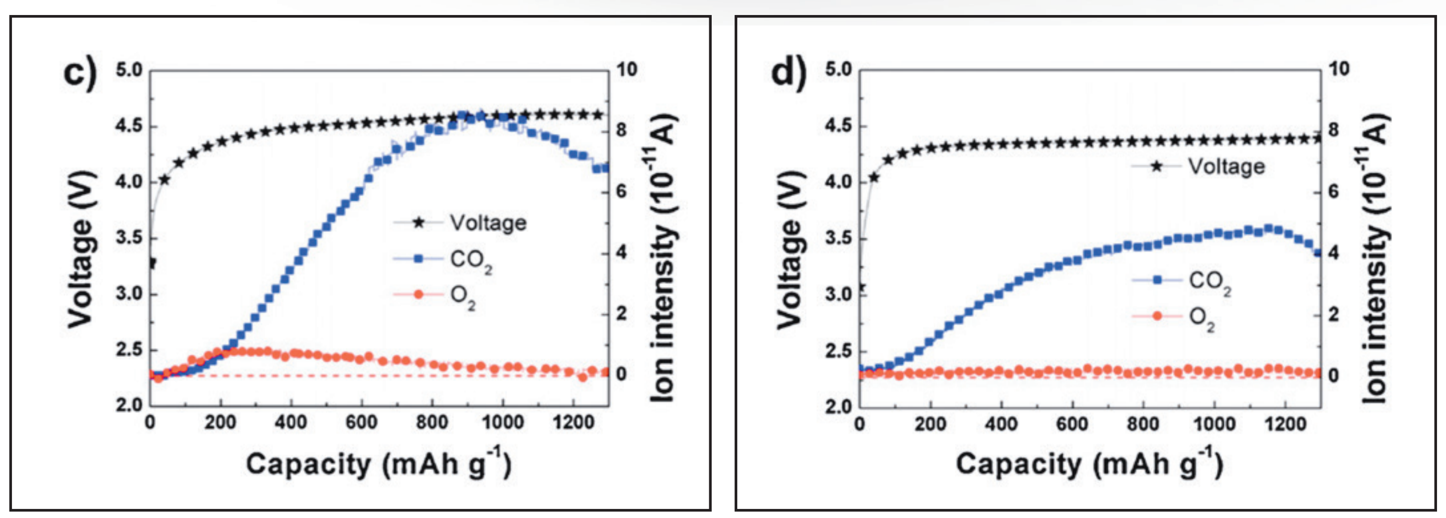


***Figure 2.** Gas evolution results of Li-O_2 cells c) without a catalyst and d) with a catalyst while charging as measured by DEMS.*

Figure 1: K. Kang et al. (2013) *"Mechanism of Co_3O_4/graphene catalytic activity in Li-O_2 batteries using carbonate based electrolytes"* Electrochimica Acta **90**, 63-70

Figure 2: E. L. Clark, M. R. Singh, Y. Kwon, and A. T. Bell (2015) *"Differential Electrochemical Mass Spectrometer Cell Design for Online Quantification of Products Produced during Electrochemical Reduction of CO_2"* Anal. Chem., **87** (15), 8013–8020

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