# High precision estimation of Pt catalyst utilization by determining the effect of HER and crossover of hydrogen HOR via water cycled cyclic voltammetry

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The cyclic voltammetry is one of the most widespread technique for measuring electrochemically available surface area (ECSA) of the PEFC electrode, which represent for the surface utilization of Pt noble catalyst. Normally on the MEA level, the ECSA is estimated from integrated charges involved in the hydrogen adsorption peak. However, the H2 evolution and H2 crossover in the cathode may create a large amount of HER and HOR peak, which overlaps with HAD peak and act as technical barrier in obtaining accurate value of the ECSA. In this work, the water cycled CV was conducted to obtain the accurate Pt utilization by suppressing the unnecessary HER/HOR peak. By alternating DI-water instead of N2 gas, the HER/HOR was suppressed by low diffusivity of H2 gas in liquid. To verify effect of the testing condition in the CV artifact shape, the purge rate of nitrogen purged water was controlled. The water flow in the catalyst layer was necessary to avoid the large amount of HOR peak which induce overestimate of HOR peak by stagnant H2 gas from the Pt surface. In this work, The water cycled CV was conduct to estimate intrinsic ECSA from PEFC catalyst layer and diminish additional HER/HOR peak.