Title:	Precision and correctness in the evaluation of electrocatalytic water splitting: revisiting activity parameters with a critical assessment
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Abstract:	The number of research reports published in recent years on electrochemical water splitting for hydrogen generation is higher than for many other fields of energy research. In fact, electrochemical water splitting, which is conventionally known as water electrolysis, has the potential to meet primary energy requirements in the near future when coal and hydrocarbons are completely consumed. Due to the sudden and exponentially increasing attention on this field, many researchers across the world, including our group, have been exerting immense efforts to improve the electrocatalytic properties of the materials that catalyze the oxygen evolution reaction (OER) at the anode and the hydrogen evolution reaction (HER) at the cathode, aided by the recent revolutionary discovery of nanomaterials. However, the pressure on the researchers to publish their findings rapidly has caused them to make many unnoticed and unintentional errors, which is mainly due to lack of clear insight on the activity parameters. In this perspective, we have discussed the use and validity of ten important parameters, namely overpotential at a defined current density, iR-corrected overpotential at a defined current density, Tafel slope, exchange current density (j0), mass activity, specific activity, faradaic efficiency (FE), turnover frequency (TOF), electrochemically active surface area (ECSA) and measurement of double layer capacitance (Cdl) for different electrocatalytic materials that are frequently employed in both OER and HER. Experimental results have also been provided in support of our discussions wherever required. Using our critical assessments of the activity parameters of water splitting electrocatalysis, researchers can ensure precision and correctness when presenting their data regarding the activity of an electrocatalyst.
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