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Study of surface charge density on solid/liquid interfaces by modulating the electrical double layer¹ HYUK KYU PAK, JONG KYUN MOON, Ulsan National Institute of Science and Technology, Korea — A solid surface in contact with water or aqueous solution usually carries specific electric charges. These surface charges attract counter ions from the liquid side. Since the geometry of opposite charge distribution parallel to the solid/liquid interface is similar to that of a capacitor, it is called an electrical double layer capacitor (EDLC). Therefore, there is an electrical potential difference across an EDLC in equilibrium. When a liquid bridge is formed between two conducting plates, the system behaves as two serially connected EDLCs. In this work, we propose a new method for investigating the surface charge density on solid/liquid interfaces. By mechanically modulating the electrical double layers and simultaneously applying a DC bias voltage across the plates, an AC electric current can be generated. By measuring the voltage difference between the plates as a function of bias voltage, we can study the surface charge density on solid/liquid interfaces. Our experimental results agree very well with the simple equivalent circuit model proposed here. Furthermore, using this method, one can determine the polarity of the adsorbed state on the solid surface depending on the material used.

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