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In-situ electrochemistry in photoemission microscopy SLAVOMIR NEMSAK, JOHANNA HACKL, PGI-6, Forschungszentrum Juelich, HONGXUAN GUO, EVGHENI STRELCOV, ALEXANDER YULAEV, Center for Nanoscale Science and Technology, NIST, DAVID MUELLER, CLAUS SCHNEIDER, PGI-6, Forschungszentrum Juelich, ANDREI KOLMAKOV, Center for Nanoscale Science and Technology, NIST — Until recently, photoemission electron microscopy (PEEM) could not be used in studies of solid/liquid interfaces due to major instrumental difficulties. The usual technique of differential pumping, which allows photoelectrons to reach the detection in ambient pressure photoemission spectroscopy, cannot be simply realized in PEEM, mostly due to the presence of high potential difference between a specimen and extractor lens. One of the ways to overcome this problem is to use a sample capped with electron transparent molecularly impermeable membrane, which would leave the vacuum conditions between the lens and the sample unaffected [Kolmakov et al., Nat. Nano. 6, 651 (2011)]. Application of different potentials at various points on the sample then allows a use of spectromicroscopy together with electrochemistry. We present a working concept of electrochemical cell inside a photoemission microscope. The cell uses a capping membrane made of a few-layer graphene. In this configuration, the graphene membrane acts also as a top electrode and the electrochemical cell is built vertically [Kolmakov et al., Topics in Cat. 59, 448 (2016)]. A liquid contained in the cell is then imaged with photoelectrons under operating conditions with high spatial resolution and chemical sensitivity.

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