Simultaneous Topographical and Electrochemical Mapping using Scanning Ion Conductance Microscopy - Scanning Electrochemical Microscopy (SICM-SECM)

In **Figure 1**, representative SICM-SECM images are shown. In **Figure 1a**, topography image of the Au/Pyrex pattern is shown. **Figure 1c** (top) shows the line profile of the topography image. The measured pitch width is 20.06 µm, which matches the actual pitch width (20 µm). The measured height of the Au bar is 302.03 nm, which is, again, agrees with the actual feature height of 300 nm. In **Figure 1b**, electrochemical activity map of the same region seen in **Figure 1a** is shown. The absolute value of the Faradaic current over Au is ~4.5 nA, while over Pyrex, the absolute value of the Faradaic current is ~3.6 nA. An overall ~981 pA Faradaic current difference is observed. Correlation of the topography and Faradaic current images reveals the expected contrast, with enhanced Faradaic current over the conductive Au regions, consistent with positive feedback due to redox cycling, and reduced Faradaic current over insulative Pyrex trenches, consistent with negative feedback due to hindered diffusion.

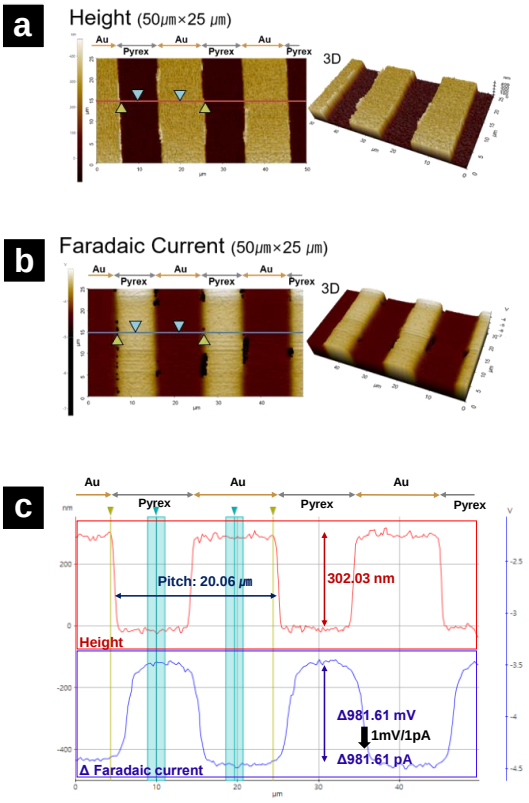

Fig.1 Representative SICM-SECM images. a) SICM topography image; b) SECM Faradaic current image. c) Line profile along the line seen in a) and b). Image size: 50 µm × 25 µm.