

Corrosion-induced Deterioration of Ni/Au Plating on Cu: a Correlative AFM-SEM Investigation via Hitachi's SÆMic. Technology

SHEET No. 027

SÆMic.
Scanning Atomic and Electron Microscopy

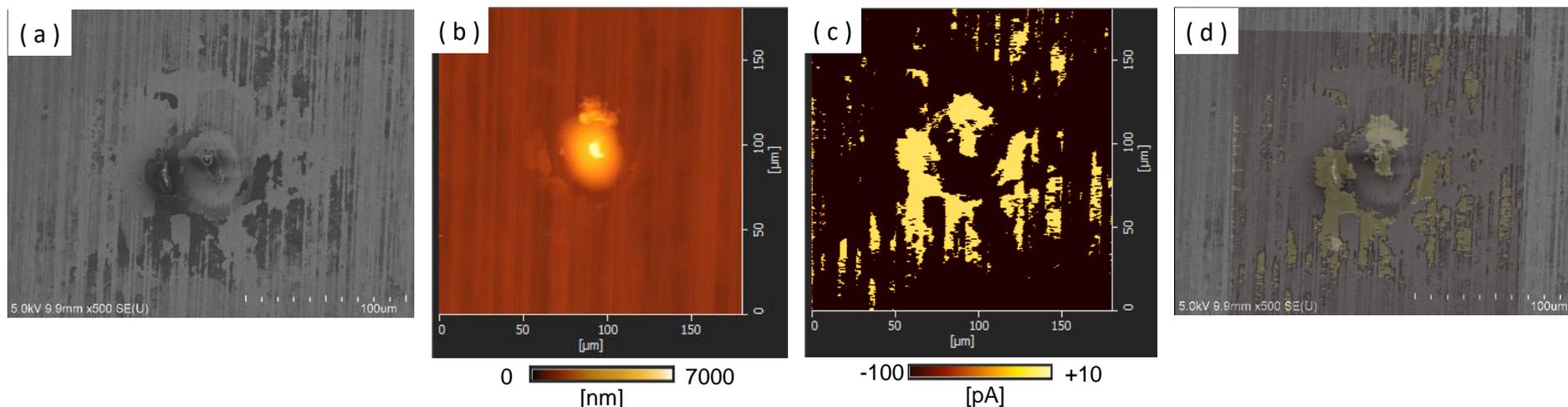


Fig.1. Bump on Au plating (a) SEM SE image (b) AFM topography image (c) AFM current image (d) Overlay of AFM current and SE image

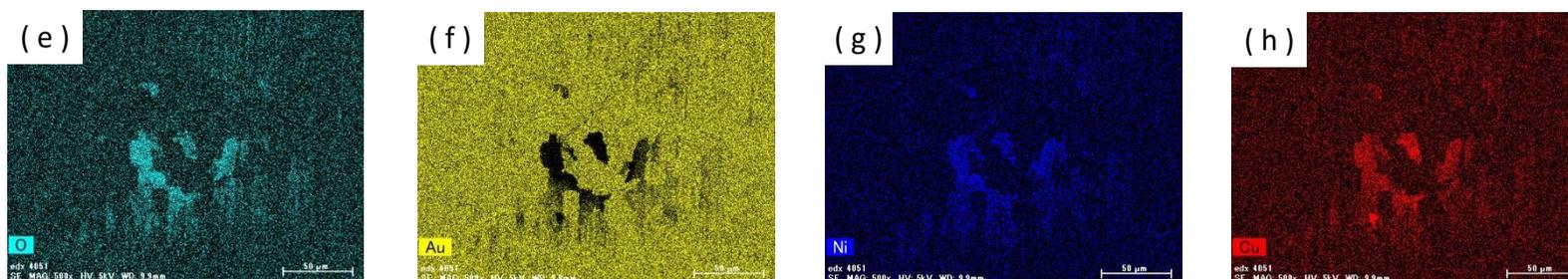


Fig.2. EDX analysis results of bump on Au plating (e) O (f) Au (g) Ni (h) Cu

A piece of an electrode with a Ni/Au plating on Cu was exposed to the salt spray test for 24 hours and thereafter analyzed by the Hitachi-proprietary correlation microscopy technology (SÆMic.), in which a specially designed linkage system was utilized to render *in-situ* AFM and SEM imaging.

Fig.1 shows the data of SEM and conductive AFM measurements. The bump point of the sample in the SEM image was reexamined by the AFM; it was verified from the AFM topography image that it was about 7 μm higher than the surrounding area. The corresponding current image was simultaneously collected while a -0.2 V bias voltage was applied, and it indicated that the regions surrounding the bump were less conductive since lower currents were captured.

Fig. 2 shows the composition analysis with EDX. As revealed by those elemental mappings, higher concentrations of O, Ni, and Cu in conjunction with a lower concentration of Au were observed in those regions round the bump. In addition, it was found in AFM current image that the current did not flow easily in this area. Therefore, combined AFM-SEM data imply the deterioration of the electrode due to the peeling of Au from corrosion.

In summary, this application brief demonstrates that correlative AFM-SEM investigations using the Hitachi AFM and SEM systems provide a better understanding of the impact and mechanism of corrosion.



Metal 【Au plating for electrodes】

Recommended configuration	Remarks
AFM5500M	
<ul style="list-style-type: none"> Conductive AFM 	
<ul style="list-style-type: none"> SEM-AFM linkage system 	
Regulus Series Scanning Electron Microscope	



AFM5500M



Regulus Series