**Influence of surface defects on the metal electrochemical deposition onto *p*-type Si**

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Since the recent incorporation of electrodeposited copper into electronic devices, a renewal of interest for electrodeposition and related technologies have found new applications in electronics manufacturing, especially for packaging and magnetic recording [1]. Due to the Schottky diode behavior of the semiconductor/ electrolyte junction n-type semiconductors are preferentially used in electrodeposition processes. Mechanisms and kinetics of the metal electrochemical deposition onto n-Si was recently reported (see e.g. Ref [2]).

More recently, selective metal electrodeposition onto p-Si at surface defects created by focussed ion implantation has shown that surface defects play crucial role in deposition processes [3].

The present work investigate therefore the influence of controlled mechanical defects onto the metal electrodeposition processes. The micro- and nano-scaled defects are created using a micro-indenter or an atomic force microscope (AFM) equipped with single-crystalline diamond tips. Traditional electrochemical techniques as well as micro-capillary experiments (Fig. 1) and capacitance measurements are used to compare the electrochemical behavior of intact and defective p-Si surfaces. From these investigations, it appears clearly that deposition of metals such as Cu and Pd is strongly enhanced by the introduction of mechanical defects. A patterning technique is therefore proposed (Fig. 2).

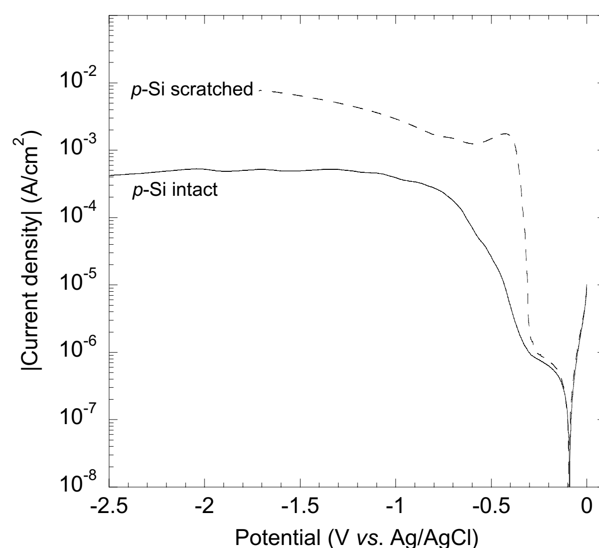


**Fig. 1:** Polarization curves for intact (full line) and scratched (broken line) *p*-Si obtained using a micro-capillary in 0.01 M $CuSO_4$ + 0.05 M $H_2SO_4$.

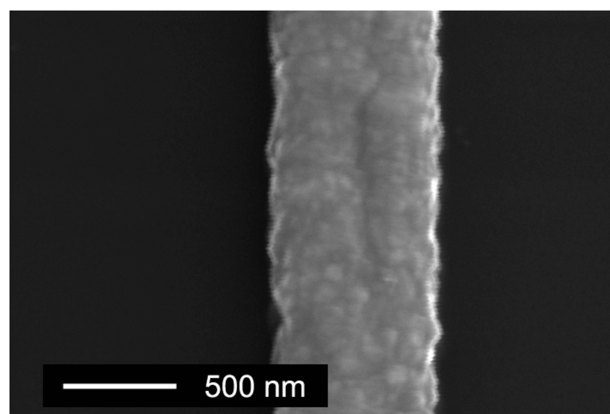


**Fig. 2:** SEM image of copper deposit on AFM-scratched *p*-type silicon. Deposition was carried out from $CuSO_4$ (0.01 M) + $H_2SO_4$ (0.05 M) at – 400 mV (Ag/ AgCl) during 15 s.

## References:

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