

Surface Plasmon Modified Photo-electrochemistry

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The surfaces of metal electrodes used in photo-catalysis and solar cells are usually flat, which limits the efficiency of light absorption due to their high reflection. If textured metal electrodes are used, light absorption can be enhanced considerably because of the excitations of Surface Plasmon (SP). Thus, textured metal electrodes may improve many photo-electrochemical processes, such as photo-current, photo-voltaic, and photo-chemical reactions.

Sample fabrication and SEM images

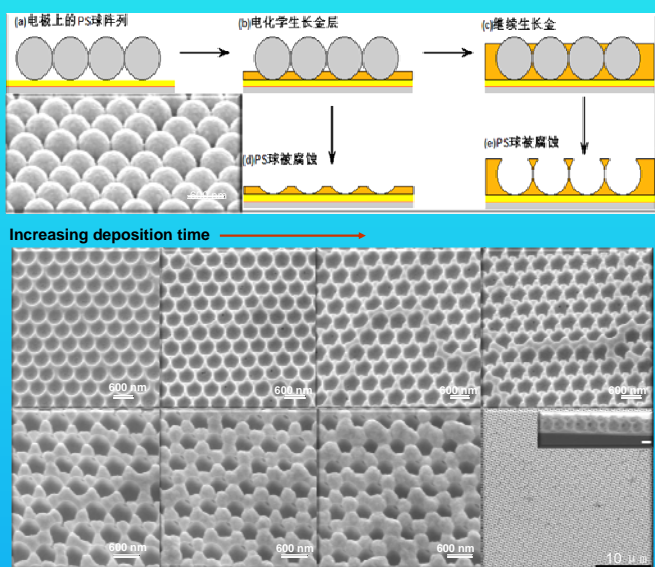
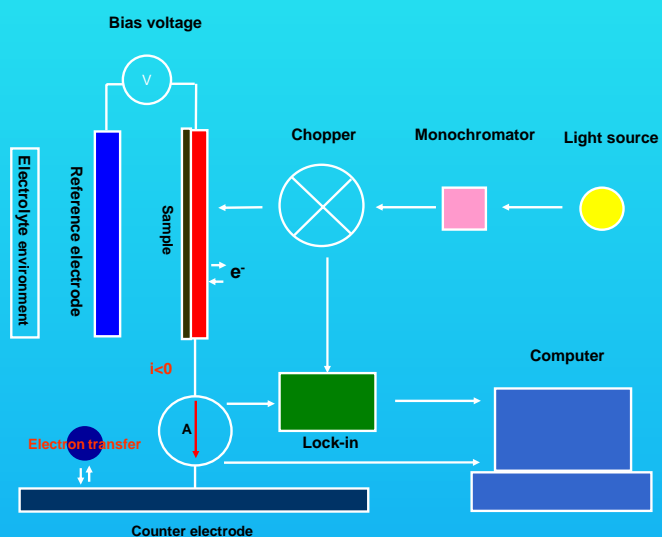
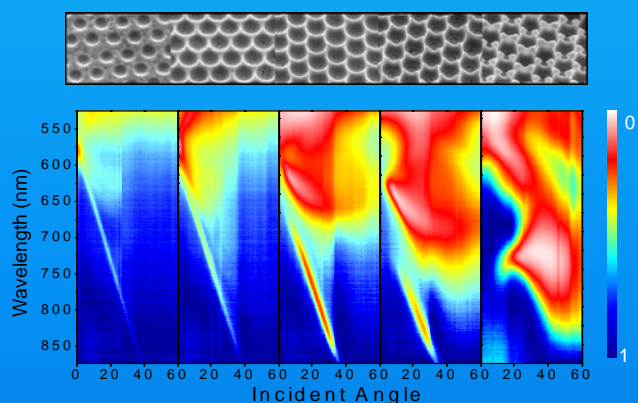


Photo-electrochemistry experimental setup



Reflection spectra of textured electrodes



- Reflection is strongly modified by the textured structures.
- Low reflection exists for a wide range of wavelengths and incident angles.
- Low reflection results from the excitations of localized surface plasmons..

SP enhanced photo-current

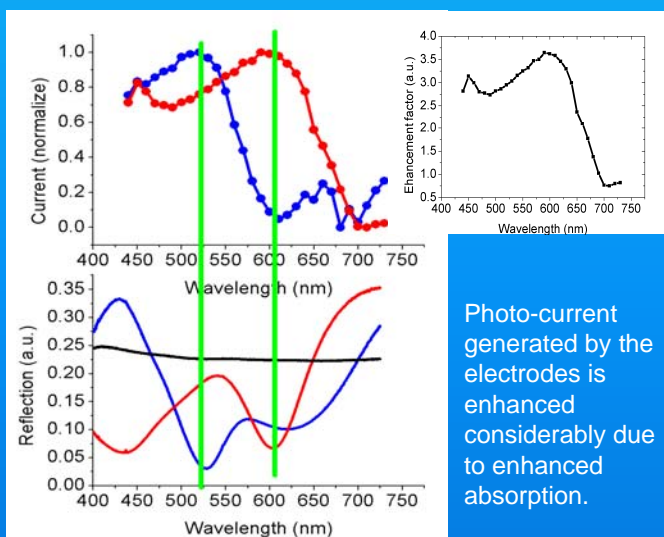


Photo-current generated by the electrodes is enhanced considerably due to enhanced absorption.

Summary

- Textured metal electrodes can capture light more efficiently.
- Textured metal electrodes can enhance photocurrent considerably.
- Textured metal electrodes can modify chemical reaction processes.

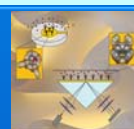
Perspective



Solar cell



Photo-catalyst



Sensor