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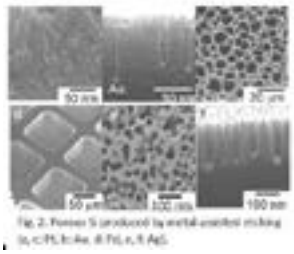
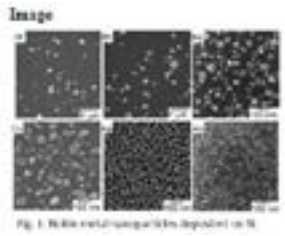
Metal nanoparticle electroless deposition and nanostructure production on silicon

Shinji Yae

University of Hyogo, Japan

Noble metal nanoparticles on silicon wafers can form microstructures not only by electroless deposition of themselves but also by their catalytic activity for etching of silicon and initiation of electroless metal deposition. We fabricate various noble metal nanoparticles on silicon by electroless displacement deposition and apply them to metal-assisted hydrofluoric acid (HF) etching of silicon autocatalytic electroless deposition of metal on silicon, solar-hydrogen production using photoelectrochemical cells, and noble metal recovery from waste electrical and electronic equipment. In this presentation, noble metal nanoparticles and nanostructures formed on silicon surfaces by these processes are described.





Recent Publications

1. Yae S, Nasu N, Matsumoto K, Hagihara T, Fukumuro N and Matsuda H (2007) Nucleation behavior in electroless displacement deposition of metals on silicon from hydrofluoric acid solutions. Electrochimica Acta 53(1):35-41.
2. Yae S (2011) Solar Cells - New Aspects and Solutions, solar to chemical conversion using metal nanoparticle modified low-cost silicon photoelectrode. Edited by Leonid Kosyachenko, Croatia, 11:231-254, DOI: 10.5772/1759.
3. Yae S, Morii Y, Fukumuro N and Matsuda H (2012) Catalytic activity of noble metals for metal-assisted chemical etching of silicon. Nanoscale Research Letters 7:352.
4. Hagihara T, Yaori K, Iwakura K, Fukumuro N and Yae S (2015) Electrochemical quartz crystal microbalance study of the electrodeposition of platinum. Electrochimica Acta 176:65-69.
5. Fukuda K and Yae S (2016) Electroless displacement deposition of gold from aqueous source —recovery from waste electrical and electronic equipment (WEEE) using waste silicon powder in the book The Recovery of Gold from Secondary Sources, Edited by Syed Sabir, Imperial College Press, London, 3:57-94, DOI: 10.1142/9781783269907_0003.

Biography

S Yae is a Professor in the Department of Chemical Engineering and Materials Science, Graduate School of Engineering, University of Hyogo. He holds a PhD degree from Osaka University, Osaka, Japan. He was a Research Associate at Osaka University from 1990 to 1998, and an Assistant and Associate Professor at Himeji Institute of Technology (presently University of Hyogo) from 1998 to 2015. He is the Vice-Chief Editor of ***Journal of the Surface Finishing Society of Japan*** and the Secretary General of the 3rd International Symposium on Anodizing Science and Technology AST2019, which will be held in Awaji Island, Hyogo, Japan from 2nd to 5th June 2019. He has published more than 90 original papers in reputed journals and five book chapters.

yae@eng.u-hyogo.ac.jp