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(54) **METHOD FOR PRODUCING SILICON NANOSTRUCTURES**

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Peng, K., Wu, Y., Fang, H., Zhong, X., Xu, Y. and Zhu, J. (2005), Uniform, Axial-Orientation Alignment of One-Dimensional Single-Crystal Silicon Nanostructure Arrays. *Angew. Chem. Int. Ed.*, 44: 2737-2742.*

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Effect of Catalyst Shape and Etchant Composition on Etching Direction in Metal-Assisted Chemical Etching of Silicon to Fabricate 3D Nanostructures Owen James Hildreth, Wei Lin, and Ching Ping Wong *ACS Nano* 2009 3 (12), 4033-4042.*

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Oxidation Rate Effect on the Direction of Metal-Assisted Chemical and Electrochemical Etching of Silicon Zhipeng Huang, Tomohiro Shimizu, Stephan Senz, Zhang Zhang, Nadine Geyer, and Ulrich Gösele *The Journal of Physical Chemistry C* 2010 114 (24), 10683-10690 Publication Date (Web): May 27, 2010.*

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Peng, K. Q., Hu, J. J., Yan, Y. J., Wu, Y., Fang, H., Xu, Y., Lee, S. T. and Zhu, J. (2006), Fabrication of Single-Crystalline Silicon Nanowires by Scratching a Silicon Surface with Catalytic Metal Particles. *Adv. Funct. Mater.*, 16: 387-394. Article first published online: Dec. 8, 2005.*

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See application file for complete search history.

(57) **ABSTRACT**

(56) **References Cited**

The present invention provides silicon nanostructures and their producing method. By employing a metal-assisted chemical etching method, the bottom of the produced silicon nanostructures, connected to the silicon substrate, is porous and side etched, such that the silicon nanostructures can be easily transferred to a hetero-substrate by a physical manner.

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19 Claims, 8 Drawing Sheets

