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Multiple optical resonances in subwavelength silicon-related nanostructures WEN-BO SHI, ZHI-YONG JIA, REN-HAO FAN, RU-WEN PENG, MU WANG, National Laboratory of Solid State Microstructures and School of Physics, Collaborative Innovation Center of Advanced Microstructures, Nanjing Univers, PENG'S TEAM TEAM — In this work, we have studied multiple optical resonances in silicon-related nanostructures. Firstly, we show that quantum efficiency can be significantly enhanced in an ultra-thin silicon solar cell coated by a fractal-like pattern with various optical modes excited including cavity and SP modes. In the second, we design thin-film silicon solar cell sandwiched by trapezoidal surface and silver grating. As multiple resonance modes are excited, broadband light can be efficiently trapped and absorbed. Furthermore, by coupling silicon nanocylinders, hybrid resonant modes are formed thus a broadband scattering response is achieved. We also demonstrate the existence of dual Fano resonances in a silicon nanodimer, which result from dipole coupling. The investigations provide unique designs for high-performance solar cells of thin-film silicon and silicon-based broadband nanoantennas and nanosensors. References: L. H. Zhu, M. R. Shao, R.W. Peng, *et al*. Optics Express, 21, A313 (2013); W. B. Shi, R. H. Fan , R.W. Peng *et al* J. Appl. Phys. 117, 065104 (2015); C. Wang, Z. Y. Jia, R. W. Peng, *et al* J. Appl. Phys. 115, 244312 (2014). Z. Y. Jia, J. N. Li, R. W. Peng, *et al.* J. Appl. Phys. 119, 074302 (2016).

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