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Precise investigation of optical/electronic fine structures of nanostructures via cathodoluminescence spectroscopy DAPENG YU, XINLI ZHU, JIASEN ZHANG, ZHIMIN LIAO, XIAOBING HAN, QIANG FU, State Key Laboratory for Mesoscopic Physics, and Electron Microscopy Laboratory, Department of Physics, Peking University, Beijing 100871, P.R.China, WANLIN GUO, Institute of Nano Science, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, P.R.China, XUEWEN FU, JUN XU, State Key Laboratory for Mesoscopic Physics, and Electron Microscopy Laboratory, Department of Physics, Peking University, Beijing 100871, P.R.China, PEKING UNIVERSITY COLLABORATION, NANJING UNIVERSITY OF AERONAUTICS AND ASTRONAUTICS COLLABORATION — High special/energy resolution cathodoluminescence (CL) spectroscopy enables us to make precise investigation on the optical/electronic fine structures in nanostructures. The linear distribution of strain gradient from tensile to compression in bent ZnO nano/microwires provides ideal conditions to address the modification of the electronic structures by strain in semiconductor materials. Radial line scan of the CL spectroscopy along bent ZnO wires at liquid helium temperature shows very fines excitonic emission structures, which demonstrates systematic red shift towards the increase of tensile strain, and blue shift as well as excitonic peak splitting towards the increase of compressive strain. First-principle simulations reveal an electronic band structure evolution under continuously tuned strain.

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