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Self-Organized Growth of Single Crystalline Copper Nanobead Strings by Electrodeposition CONG MENG, RUWEN PENG, MU WANG, Nanjing University — Here we report a self-organized growth of single-crystalline strings of nano sized copper beads electrodeposited from an ultrathin layer of CuSO4 electrolyte solution without adding any additives. Spontaneous oscillation of voltage/current has been observed when potentiostatic/galvanostatic mode is applied. Scanning electron microscopy indicates that the filaments developed from the cathode are made of smooth copper beads a few hundreds of nanometers in size connected by thin single-crystalline rods. The periodicity along the string may vary from 500nm to one micron, and the spatial periodicity is strict up to hundreds of microns. To pinpoint the growth mechanism, we intentionally terminate the growth at different stage of the spontaneous oscillation of the voltage across the electrodes, and established the relation of the microscopic deposit morphology and the voltage oscillations. A growth mechanism is proposed based on the experimental observations. Structural and luminescent properties of the copper strings have been investigated, and the possible applications of such a unique structure have been discussed.

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