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Atomic structure, energetics, and dynamicsof topological solitons inindium chains on Si(111) surfaces HUI ZHANG, Hefei National Laboratory for Physical Sciences at Microscale and Department of Physics, USTC, JIN-HO CHOI, JUN-HYUNG CHO, Department of Physics, Hanyang University, CHANG-GAN ZENG, ZHENYU ZHANG, JIANGUO HOU, ICQD, Hefei National Laboratory for Physical Sciences at Microscale and Department of Physics, USTC — Besides the presence of exotic ground states, potentially more intriguing are the elementary excitations of the One-dimensional charge density waves (1D-CDWs), including the nonlinear topological excitation or soliton. Solitons may possess spin-charge inversion properties, and act as the effective carriers that account for the high conductivity in conducting polymers. Howevercomprehensive quantitative study of topological solitary excitations at the atomic level remains a challenge. In this talk, I will present our recent work on the quantitative haracterization of solitons in In chains grown on Si(111) surfaces at atomic scale. The precise atomic structure of the topological soliton in In/Si(111) is determined based on scanning tunneling microscopy and first-principles calculations.Variable emperature measurements of the soliton population allow us to determine the soliton formation energy to be ∼60 meV, smaller than one-half of the band gap of ∼200 meV. Once created, these solitons have very low mobility; the sluggish nature is attributed to the exceptionally low attempt frequency for soliton migration. We furtherdemonstrate local electric ?eld enhanced soliton dynamics, and the feasibility of aggregating solitonsinto soliton polymers.

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