Coalescence of Single-Walled Carbon Nanotubes

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The coalescence of single-walled nanotubes is studied in situ under electron irradiation at high temperature in a transmission electron microscope. The merging process is investigated at the atomic level, using tight-binding molecular dynamics and Monte Carlo simulations. Vacancies induce coalescence via a zipper-like mechanism, imposing a continuous reorganization of atoms on individual tube lattices along adjacent tubes. Other topological defects induce the polymerization of tubes. Coalescence seems to be restricted to tubes with the same chirality, explaining the low frequency of occurrence of this event.

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