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A plasma-approach for catalyst-free carbon nanotubes growth on arbitrary mechanically-written Si features SHAILESH KUMAR, IGOR LEVCHENKO, KOSTYA (KEN) OSTRIKOV, CSIRO CMSE, PLASMA NANOSCIENCE CENTRE AUSTRALIA (PNCA) TEAM — Synthesis of carbon nanotube arrays commonly involves complex multi-stage formation of the required patterns of catalyst nanoparticles. Integration of nanotubes into silicon-based nanodevice platforms ultimately requires completely catalyst-free growth. The presence of catalyst particles introdces the contact losses. Moreover, its catalytic activity is also challenging during the nucleation and growth process. A novel, uniquely plasma-enabled has been demonstrated for catalyst-free, and very fast growth of long vertically-aligned multiwalled carbon nanotubes arranged into dense high-quality arrays strictly within arbitrary mechanically-written patterns. This phenomenon is attributed to the unique features of the low-temperature plasma in direct contact with the hierarchically structured Si surface. This unique, yet simple and environmentally-benign plasma-enabled approach paves a pathway for integration of catalyst-free carbon nanostructures directly into a nanodevice platform for the future applications.

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