Abstract Submitted
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Synchrotron X-ray and optical studies of the DNA-mediated growth of plasmonic nanostructures[1] GANG CHEN, GENG WANG, XIAONAN ZHANG, HEPING GENG, LIFENG XU, WENQIN LI, XIN LIU, Shanghai Synchrotron Radiation Facility, Shanghai Institute of Applied Physics, Chinese Academy of Sciences, Shanghai, China 201204 — Reproducible and controllable growth of nanostructures with well-defined physical and chemical properties is a longstanding problem in nanoscience. A key step to address this issue is to understand their underlying growth mechanism, which is often entangled in the complexity of growth environments and obscured by rapid reaction speeds. Synchrotron x-rays, because of their specific wavelengths (nanometers) and advantages of large flux, high penetration and adjustable photon energy, have a particularly important position in structural and electronic characterizations of nanomaterials. Herein, we demonstrate that the evolution of size, surface morphology, and the optical properties of plasmonic nanostructures could be quantitatively intercepted by dynamic and stoichiometric control of the DNA-mediated growth. By combining synchrotron-based small-angle X-ray scattering with transmission electron microscopy, we reliably obtained quantitative structural parameters for these fine nanostructures that correlate well with their optical properties as identified by UV/Vis absorption and dark-field scattering spectroscopy. We report growth mechanisms for SERS active plasmonic nanostructures, and the remarkable interplay between their morphology and plasmonic properties.

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