Artificially designed Ostwald ripening of as-grown inorganic nanoparticles

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In inorganic nanoparticles (NPs) nucleation, Ostwald ripening occurs spontaneously because small-sized nuclei have high surface energy enough to activate its surface atoms to dissolve and redeposit continuously. After growth of NPs completes, this phenomenon is barely observed; Capping agents can stabilize the curvature-lessened surface of as-grown NPs in its own condition. Herein we supposed and proved an 'artificial' Ostwald ripening system composed of hexadecyltrimethylammonium bromide (CTAB)-capped, as-grown gold NPs (AuNPs, ~20nm) and hydrogen peroxide (H_2O_2). It is the chemical combination of as-mentioned three components that forced Au to dissolve and redeposit at the same time, which is distinct from common Ostwald ripening caused by physical factors (i.e. size). This systematically designed Ostwald ripening would provide a versatile route for novel synthesis of inorganic NPs.