Synthesis and Characterization of Rectangular Palladium Nanoparticles.\textsuperscript{1} YUAN SUN, Dept. Mat. Sci. & Eng., SUNY at Stony Brook, LIHUA ZHANG, ELI SUTTER, YIMEI ZHU, Center for Functional Nanomaterials, Brookhaven National Laboratory, MIRIAM RAFAILOVICH, JONATHAN SOKOLOV, Dept. Mat. Sci. & Eng., SUNY at Stony Brook — The optical, magnetic and catalytic and electronic properties of nanoparticles are affected not only by their size, but also by their shape. We have used a mild reducing agent, ascorbic acid, in the presence of sodium citrate and a surfactant, cetyltrimethylammonium bromide, at ambient conditions to prepare colloidal rectangular palladium nanoparticles, including nanocubes and nanorods. Our procedure requires no seed-mediated growth or nanoporous template so that it is more practical for large-scale synthesis. Upon changing the concentration of sodium citrate from $0.2 \times 10^{-3}$ M to $1.0 \times 10^{-3}$ M, TEM measurements indicate that the average size of the nanocubes decreases slightly from $31.8 \pm 3.2$ nm to $29.4 \pm 4.2$ nm and the aspect ratio of the nanorods increases from $2.48 \pm 1.42$ to $3.94 \pm 2.50$. HRTEM images and diffraction patterns indicate that the particles are highly crystalline and have strong (100) faceting. Being exposed to air for $\sim 100$ days, the particles are oxidized to form 2\textasciitilde4 nm-thick amorphous shells.

\textsuperscript{1}Supported by NSF-MRSEC. The CNF-BNL is supported by the U.S. DOE under DE-AC02-98CH10886.

Yuan Sun
Dept. Mat. Sci. & Eng., SUNY at Stony Brook

Date submitted: 12 Jan 2006

Electronic form version 1.4