Plasmonic noble metal nanoparticles (MNPs) retains a special place in today’s nanotechnology efforts. Their complex shapes gives them unique anisotropic optical and physico-chemical properties. Moreover, the possibility to synthesize MNPs in high yield as colloidal solution makes them cost-effective nanomaterial. The number of prospective applications for colloidal MNPs is still growing - from novel immunolabelling for both optical and electron microscopy, model nanoparticle for emerging field of theranostics, to building blocks of optical metamaterials, literally forming ordered arrays of nano-antennae. As the new technology employing MNPs emerges, the need for fast and versatile methods for their quantitative characterization is increasingly needed. Although TEM images produces superior quality with marginal noise, modern nanoparticle application often requires to characterize the particle distribution and shape purity on arbitrary substrates including non-conductive substrates as glass etc. Modern FE-SEM microscopres allows for quality images however with substantial noise. The advanced image processing filters in Mathematica™ allows to prepare the noisy micrographs for segmentation by thresholding or edge detection. The filtered images are then used for shape interactive shape detection mechanism. In this talk will be presented an image processing application in Mathematica™ designed primarily for electron microscope micrographs processing and analysis of particle shapes and size. The application combines the Mathematica™ built-in advanced image processing algorithms together with its outstanding dynamic functionality to create a fluid user interface with improved workflow of the image analysis process.

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Fig. 1: Selected screenshots from the application interface depicting (a) the image filtering part for thresholding/edge detection and (b) the component measurement with interactive histogram selection controls (left) to filter the unwanted shapes.