Lasers have proven to be efficient tools in a variety of micro/nanoscale material processing and diagnostics. In this poster, we will focus on presenting recent research activities on the laser-assisted nanomanufacturing and diagnostics. Examples include laser-assisted selective processing of nanoelements for solar and display applications, optical near-field array based scalable nanomanufacturing towards improved processing throughput, and optical and electron microscope based advanced in-situ diagnostics.