Omni usable defect scanner for surface imperfection analysis

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Optical elements in use are not ideal and prone to surface imperfections like defects or particles. This often occurs during their production and exposition, which leads to a loss in the optical performance with uncertain damages. Therefore, standard characterization tools like microscopy are used to rapidly control the surface quality. Because of the insensitivity towards vibrations and additional optical information angle resolved scattering (ARS) is a fast and sensitive smart alternative to identify and localize (sub-)microscopic surface defects.[1] Here we present our novel defect scanner combining for the first time brightfield, darkfield, and ARS to monitor the full clear aperture of objects down to single submicroscopic surface imperfections. Guiding this sensor with a robotic arm allows us to scan over wide areas for a fast data acquisition with access to freeform optics and highly offers for machine integration.