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Design Details of Multi-Functional Color Analyzer for Reflective, Transmittive and Emittive Surfaces

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Abstract
A multi-functional color analyzer instrument (MFCA) capable to measure reflective, transmittive and emittive surfaces is designed at TUBITAK UME Optics Group Laboratories. MFCA is composed of a novel designed optical light source based on mixture of spectral power distributions (SPDs) of two light emitting diodes (LEDs), a custom-made integrating sphere capable of meeting standard measurement conditions of 0°:d, 8°:d, and 0°:45°, two color detectors with different field-of-views which are designed to measure reflective or transmittive and emittive surfaces separately, self-designed three-channel transimpedance amplifiers having gain selection switches from 1×10^6 to 5×10^9 and a color evaluation software written on LabView 8.0. The linearity and color measurement performance at each measurement geometry of the designed instrument are characterized by using neutral density filters and a standard telespectroradiometer. Design details of MFCA and characterization results are presented herein.

Keywords
Multi-functional colorimeter – Color analyzer – Color measurement – Color difference evaluation