

Fluorescent glass SRMs are new tool for spectroscopy

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Researchers at the National Institute of Standards and Technology have developed two new calibration tools to help correct and validate the performance of analytic instruments that identify substances based on fluorescence.

Recent years have seen a significant increase in the development and use of fluorescence-based analytic techniques. Researchers can detect, measure and identify unknown substances—potentially including chemical and biological weapons—using spectroscopic techniques. In fluorescence spectroscopy, scientists send a beam of light at a certain wavelength into a sample, exciting electrons in particular analytes or fluorescent labels, which then emit light at longer wavelengths with measurable energy levels.

This resulting spectral signature, recorded by a fluorescence spectrometer, is distinct for different fluorescent compounds. Many of these assays are being used in areas—including clinical diagnostics, environmental monitoring and drug development—where regulatory requirements are strict and may require standards for instrument qualification and method validation.

To meet these needs, NIST has developed two ready-to-use, fluorescent glass Standard Reference Materials (SRMs), about the size of a pack of a gum, whose certified values can be used to correct fluorescence emission spectra for relative intensity. SRM 2940 (“Orange emission”) has certified values for emission wavelengths from 500 to 800 nanometers

when excited with light at 412 nm; SRM 2941 (“Green emission”) has certified values for emission wavelengths from 450 to 650 nm when excited with light at 427 nm.

To use SRM 2941 to calibrate a fluorescence spectrometer, for instance, investigators would excite the glass with light at 427 nm and collect the resulting fluorescence emission from 450 nm to 650 nm. Spectral correction factors for the instrument then could be determined by comparing the measured intensity values to the certified values. The fluorescence spectrum of any unknown sample taken on that instrument that emits from 450 nm to 650 nm then could be corrected to yield its true spectral shape.

These standards also are resistant to photodegradation, making them good performance validation standards. Researchers can use them on a day-to-day basis to validate performance by simply measuring their fluorescence intensity under the same conditions, even for fluorescence instruments with non-tunable wavelength selectors, such as filter-based fluorometers and microscopes.

Standard Reference Materials are among the most widely distributed and used products from NIST. The agency prepares, analyzes and distributes more than 1300 different materials that are used throughout the world to check the accuracy of instruments and test procedures.

Source: National Institute of Standards and Technology

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