TRACEABLE CHARACTERIZATION OF FLUORESCENCE MEASURING SYSTEMS WITH SPECTRAL FLUORESCENCE STANDARDS

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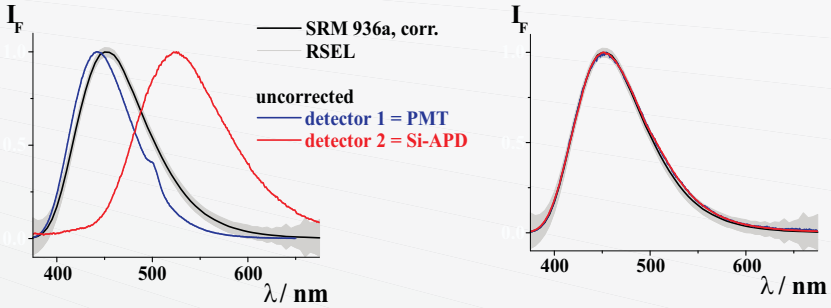
Introduction

Luminescence measurements always yield raw or uncorrected data distorted by time and wavelength dependent instrumental effects. Instrument specific correction curves are required for

- Comparability of data
- Optimization of fluorescence methods
- Quantitative fluorometry (non matching spectra of sample & standard)
- Globalization imposed quality assurrance, traceability & accreditation (ISO EN/IEC17025)

Uncorrected Emission Spectra vs. Corrected Emission Spectra



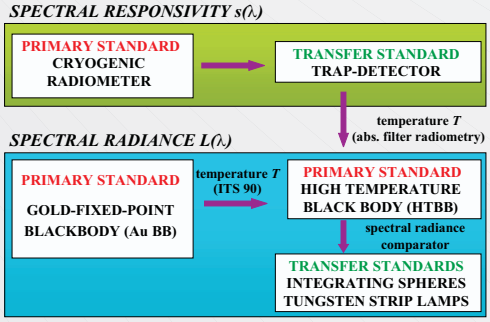
Emission spectrum of quinine sulfate dihydrate SRM936a measured with two detection systems before and after spectral correction and its corrected emission spectrum including uncertainty (RSEL)[1] as certified by NIST[2].

[1] RSEL: Estimated Relative Systematic Error Limit; [2] National Institute of Standards and Technology.

Traceability Chain of Fluorometry

Emission → Spectral radiance

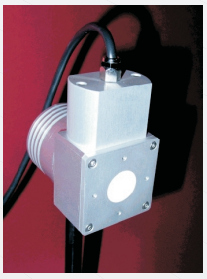
Excitation → Spectral responsivity

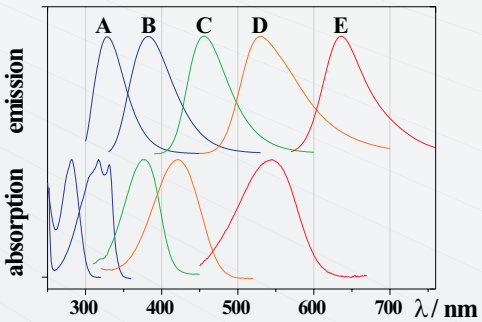


Cal. physical & cert. chemical transfer standards with known uncertainty

Emission Correction with Traceable Transfer Standards

Cal. physical transfer standard vs. Cert. chemical transfer standard





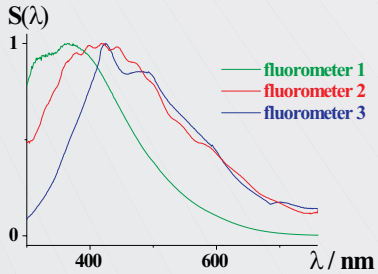
Integrating sphere (OP.DI.MA) with 5W halogen lamp
light intensity *ca.* 10^3 times higher than typical fluorescence signal

KIT *Spectral Emission Standards*
little anisotropy, known stability & purity
supply of dyes & solvent, cert. corr. emission spectra & SOP for use

KIT *Spectral Emission Standards*

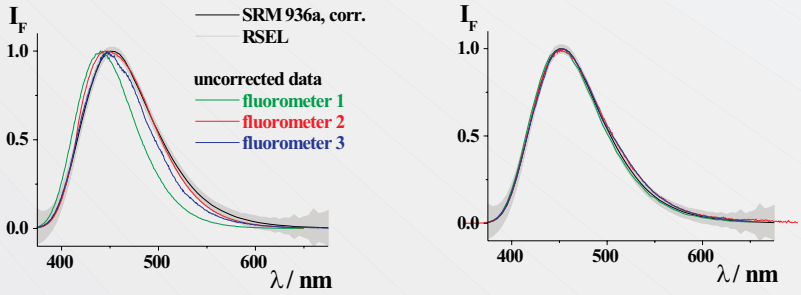
KIT raw emission spectra $I_{raw}(\lambda)$
+
cert. emission spectra $I_{cert}(\lambda)$

emission correction S(λ)
$S(\lambda) = I_{raw}(\lambda)/I_{cert}(\lambda)$



Proficiency Testing: Check on Dye Correction Curve

Uncorr. Emission spectrum x 1/S(λ) Corr. emission spectrum



Conclusion

The soon to be certified **KIT *Spectral Emission Standards*** enables the traceable, user friendly, and fast determination of the emission correction of fluorescence measuring systems as well as the linearity of the detector.