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Electronic Supplementary Information (ESI)

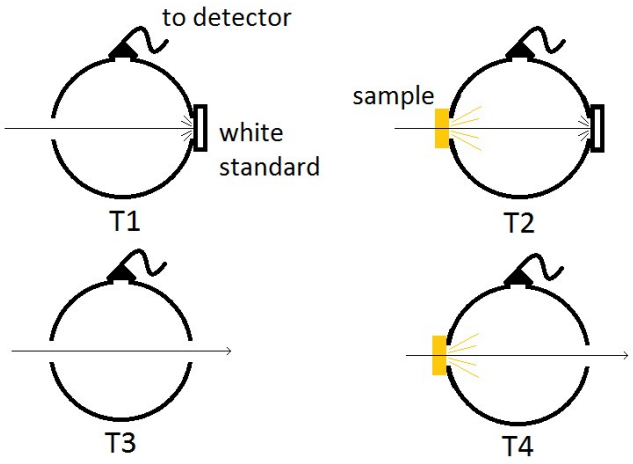
Tailorable perylene-loaded fluorescent nanostructures: a multifaceted approach enabling application in white hybrid LEDs

F. Galeotti, * W. Mróz, M. Catellani, B. Kutrzeba-Kotowska and Erika Kozma

f.galeotti@ismac.cnr.it

Haze and transmittance measurement

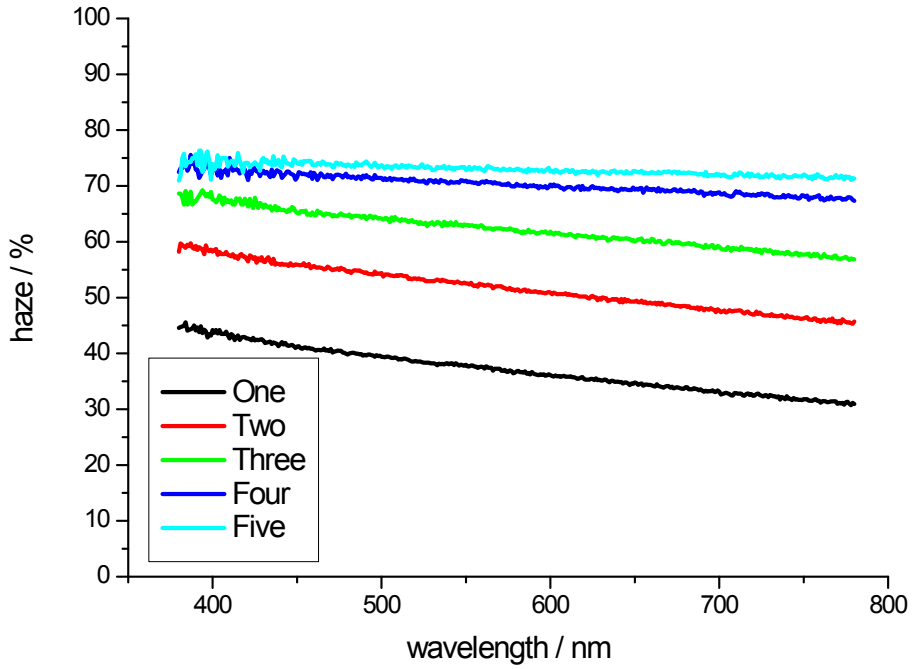
Haze measurement requires four scans using the configurations shown in the figure. In configuration T1 exit from an integrating sphere is closed with white standard, while in configuration T2 additionally a sample is placed at the entrance to the sphere. In configuration T3 light can pass through the sphere undisturbed and in configuration T4 it is scattered by the sample at the entrance to the sphere.



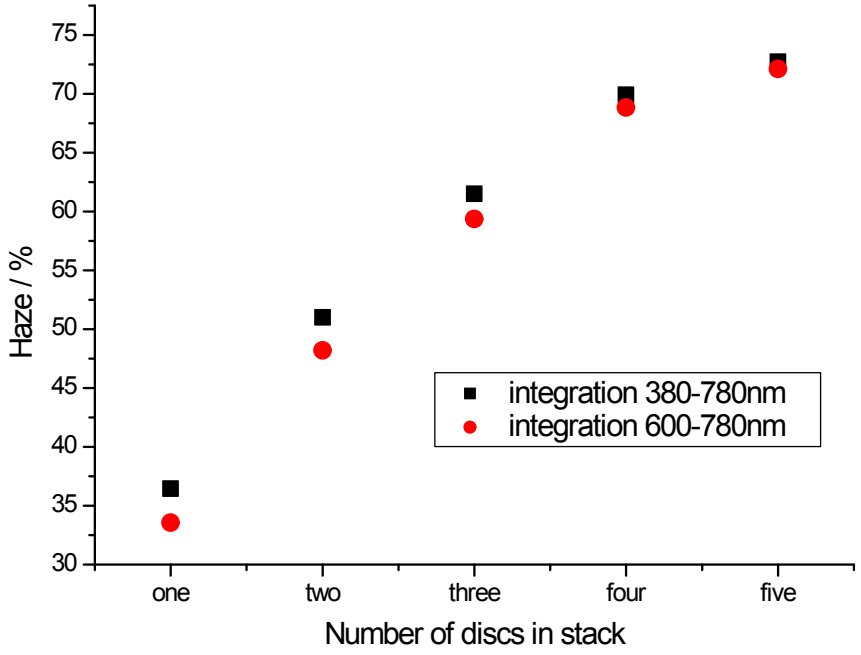
Since our discs are not only scatters but also emitters,we decided to integrate scans in two spectral ranges: all visible range (380-780nm) and the range where samples do not absorb (600-780nm). Integrated area under each spectrum was used in the formula below. Measurements were performed for number of discs in a stack ranging from one to five.

$$Haze = \left(\frac{T4}{T2} - \frac{T3}{T1} \right) \cdot 100\%$$

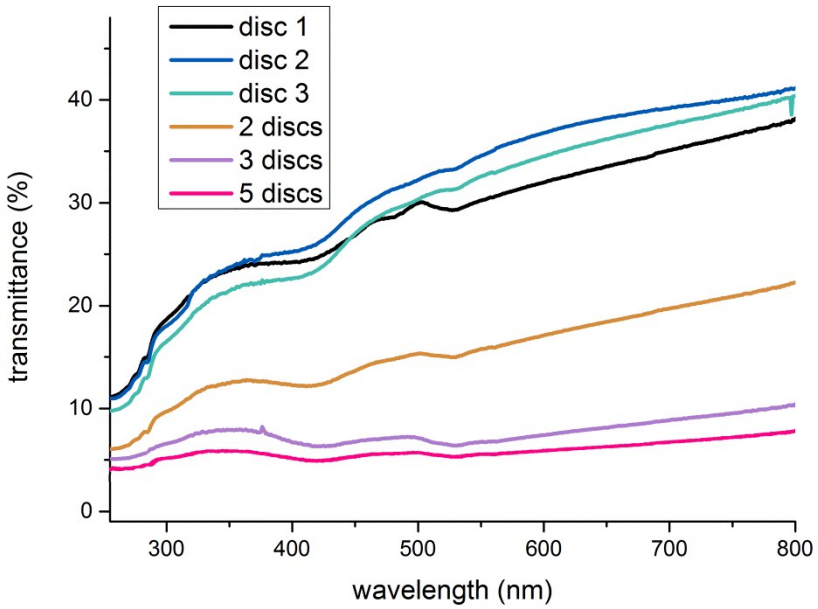
Xe lamp was used as a light source combined with monochromator (Oriel Instruments, Corner Stone 74100) and chopper. UV enhanced Si photodiode was employed a a detector. The signal from the photodiode and the reference signal from the chopper were registered by a lock-in amplifier (Signal Recovery 7265) and LabVIEW program.



The haze percentage gradually increases with the number of discs. After the addition of the fifth disc, the haze increment is small, indicating that a condition close to plateau is reached.



Measured haze of single disc is 33% for integration 600-780nm, while it is equal 36% for integration in all visible range, proving that absorption and emission of the samples have negligible effect on haze. The discrepancy between haze values for two types of integrations decreases with number of discs employed and converges to the haze value of about 75% for a thick stack, similar to the one applied in our white hybrid LED.



UV-vis measurements show that each disc has a transmittance between 25 and 40% in visible spectral range. The transmittance is lowered to the average value of 5% for a pile of five discs.