Stable Next-Generation Photovoltaics: Unravelling Degradation Mechanisms of Organic Solar Cells by Complementary Characterization Techniques

StableNextSol – MP1307

- Photo-catalysed degradation of $PC_{61}BM$ -

STSM Ref No: STSM-MP1307-24182

Camilla Lindqvist

3rd MC Meeting, 2nd WG Meeting, 2nd Conference E-MRS Symposium E @ E-MRS. Lile, Fr. June 11th- 12th, 2015

COST is supported by the EU RTD Framework Programe

ESF provides the COST Office through a European Commission contract

TITLE: Photo-catalysed degradation of $PC_{61}BM$

HOST Laboratory /Country and PI: National Physical Laboratory (UK) – Fernando Castro
GUEST Laboratory/ Country and PI: Karlstad University (Sweden) – Ellen Moons
ESR Name: Camilla Lindqvist
Duration: January 12th-23th, 2015

Objectives:

The aim was to carry out in-situ Raman spectroscopy studies using the NPL Raman instrument with environmental chambers to understand the photo-degradation product and mechanism of the degradation of $PC_{61}BM$. In addition, the degradation was monitored with photo-luminescence spectroscopy (PL).

• RESULTS

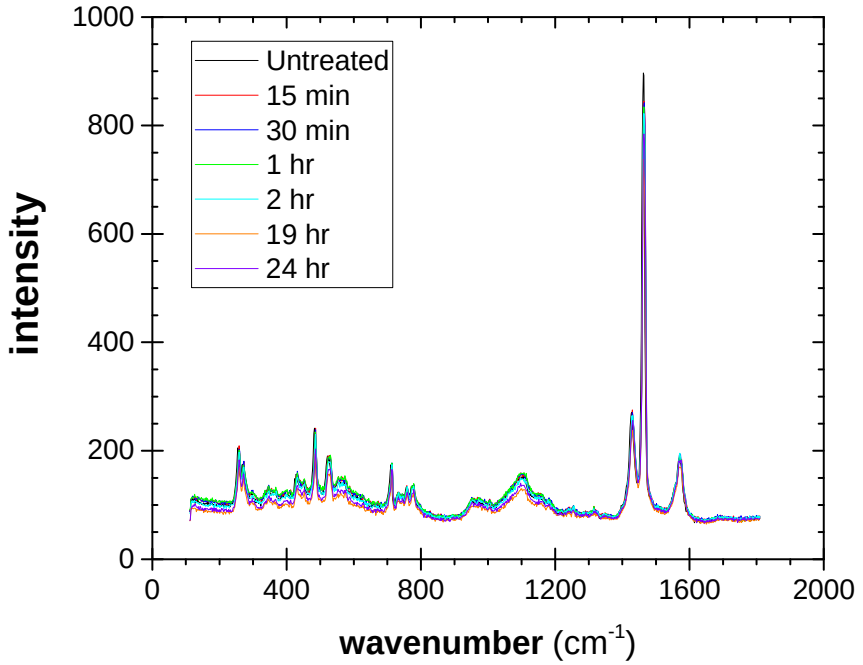


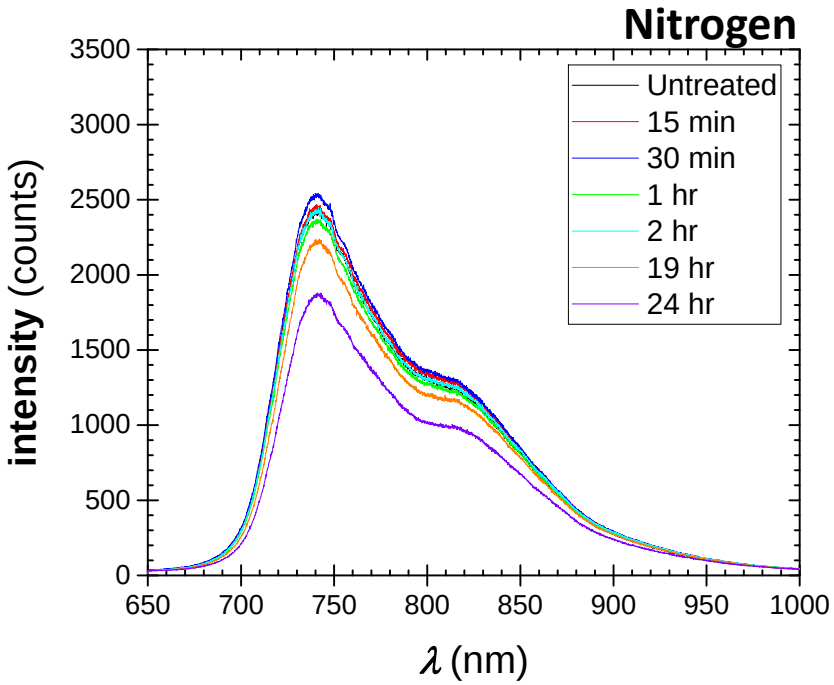
Photo-oxidation
→ changes in FTIR spectrum of PCBM
→ wanted to see if there where changes in Raman spectrum too

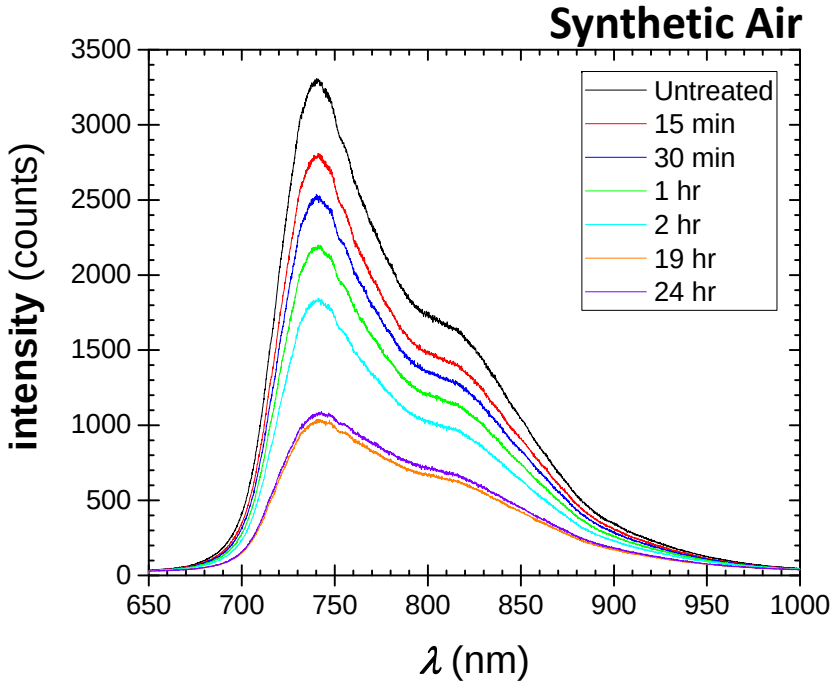
No new peaks, no shifts in peak positions

Decrease in intensity

(Excitation λ = 532 nm)

• RESULTS





Decrease in PL-measurement both in nitrogen and in air

More pronounced decrease in air

(Excitation λ = 633 nm)

- **FUTURE WORK AND COMMENTS**

Future plans:
- The goal is to combine these results with already achieved results (with other techniques) to be able to achieve a deeper understanding of the degradation mechanisms of PCBM. This will give one publication.

Comments on the experience:
- The stay at NPL was fantastic and I got a lot of results with me home which will be very useful in my project

- **CONCLUSIONS**

Raman: A decrease in intensity but no new peaks or peak shifts → no new indications about any new bonds in the molecule.

PL: A decrease in intensity but also a change in the ratio between the peak and the shoulder in the spectrum. The decrease is more pronounced in air than in nitrogen.