

## Introduction

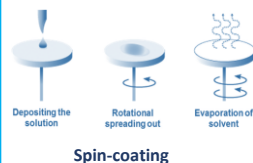
Polymorphism of organic semiconductors (OSCs) has become a topic of much interest since different polymorphs can have different properties being the main focus, in the area of semiconductors, the difference in charge mobility.

In this work, we studied N, N'-bis(n-hexyl)naphthalene-1,4,5,8-tetracarboxylic acid diimide (NDI-C6), a small molecule organic semiconductor, by performing a solid state screening combined with several characterization techniques such as hot stage optical microscopy, differential scanning calorimetry, x-ray powder diffraction and x-ray reflectivity.

Furthermore, we studied the relation between bulk polymorphism and surface induced polymorphism by preparing NDI-C6 thin films by spin-coating and thermal evaporation.

## Experimental details

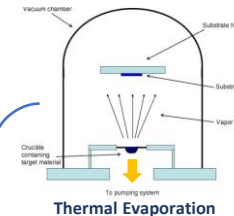
### Film fabrication techniques:



Several parameters that can influence the films

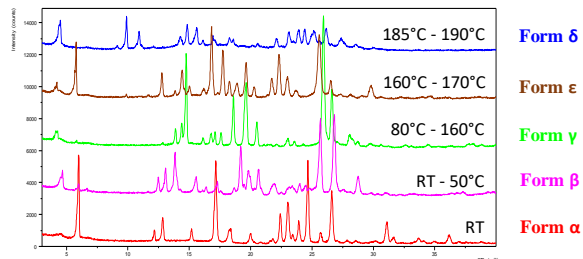
Thinner films → surface-induced polymorphism

Good for reflectivity analysis  
Thicker films → bulk phase, form β or mix

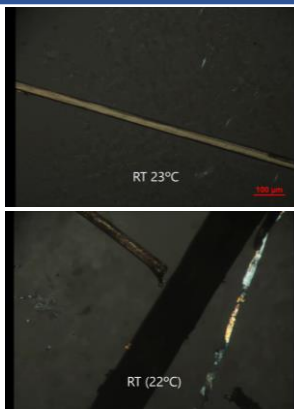


## Results

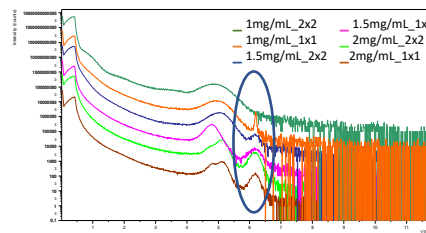
### Thermal characterization of bulk NDI-C6



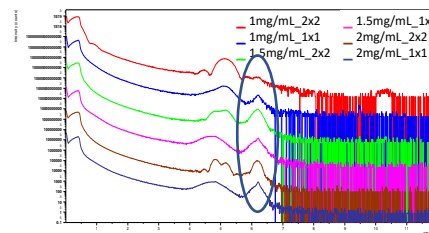
By variable temperature XRPD, it was possible to detect several crystal forms which have different temperature of stability, including the new elusive form ε that has not been reported previously.



### Films characterization – XRR



Toluene



Dichloromethane

By changing the spin-coating parameters: size of the substrate, solvent and concentration of the solution, it was obtained different polymorphs.

Some of the films are clearly a mixture of phases since the peak of form α at 6.2° is observed along with peaks at lower angles that do not belong to that form.

## Conclusions

- NDI-C6 has proven to be a molecule really prompt to generate polymorphs as it can be observed by the thermal study of the molecule as bulk, where it was obtained 4 forms, one of which has not been reported previously.
- By thermal evaporation it is obtained the bulk phases and the films are thicker than the ones prepared by spin coating.
- Using spin-coating to prepare the films it is visible new peaks that could possibly be new surface induced polymorphs.

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