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Non photochemical light induced nucléation

Anne Spasojevic - de Biré, Bertrand Clair, Aziza Ikni, Nicolas Guiblin, Igor Kornev, Xiaoxuan Shi, Jianyao Long, Hongxun Yang, Wenjing Li, Annais Mendre, et al.

► **To cite this version:**

Anne Spasojevic - de Biré, Bertrand Clair, Aziza Ikni, Nicolas Guiblin, Igor Kornev, et al.. Non photochemical light induced nucléation. Journées nationales en nanosciences et nanotechnologies, Nov 2012, Bordeaux, France. hal-02302622

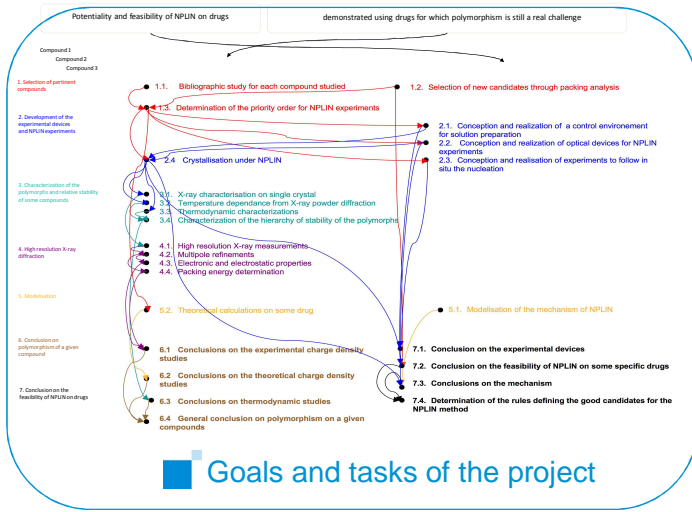
HAL Id: hal-02302622

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Submitted on 28 Sep 2020

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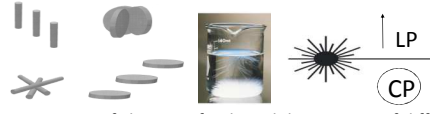


Polymorphism studies important in the industrial pharmaceutical context

Method developed on urea [1], glycine [2], L-histidine [3], Hen Egg White Lysozyme [4], Bovine P T [5], Pentyl cyanobiphenyl [6], KCl [7] [9], NaClO₃ [8], KBr [9], Acetic acid [10]

[1] Garetz B.A. et al. *Phys. Rev. Lett.* **1996**, 16, 3475-3476; Yoshikawa H.Y. et al. *Jpn J. Appl. Phys.* **2006**, 45, 302-305; Yoshikawa H.Y. et al. *Jpn J. Appl. Phys.* **2006**, L23-L26. [2] Zaccaro J., et al. *Cryst. Growth & Des.* **2001**, 1, 5-8; Garetz B.A. et al. *Phys. Rev. Lett.* **2002**, 17, Matic J. et al. *Cryst. Growth Des.* **2005**, 5, 1565-1567; Sun X.Y. et al. *Cryst. Growth Des.* **2005**, 5, 684-689; Sugiyama T. et al. *Chem. Lett.* **2007**, 12, 1489-1491; Sun X.Y. Ph.D. **2008**; Sugiyama T. et al. *Chem. Lett.* **2009**, 15, 482-483. [3] Sun X.Y. et al. *Cryst. Growth Des.* **2008**, 8, 1720-1722. [4] Lee et al. *Crystal Growth & Design* vol.8 **2008** n°12, 4255-4261 [5] Lee et al. *Crystal Growth & Design* vol.8 **2008** n°12, 4255-4261 [6] Sun et al., *Phys. Rev. E* vol.79 **2009** 021701 [7] Alexander A.J. et al. *Cryst. Growth Des.* **2009**, 9, 958-963; Duffus A.J. et al. *J. Am. Chem. Soc.* **2009**, 131, 11676-11677; Ward M.R. et al. *Phys. Rev. Lett.* **2009**, 481, 25-28. [8] Ward et al. *J. Chem. Phys.* Vol. **135** **2011** 114508 [9] Ward et al. *Crystal Growth & Design* vol.12 **2012**, 4554-4561 [10] Ward et al. *Phys. Chem. Chem. Phys.* **2011** Vol.14

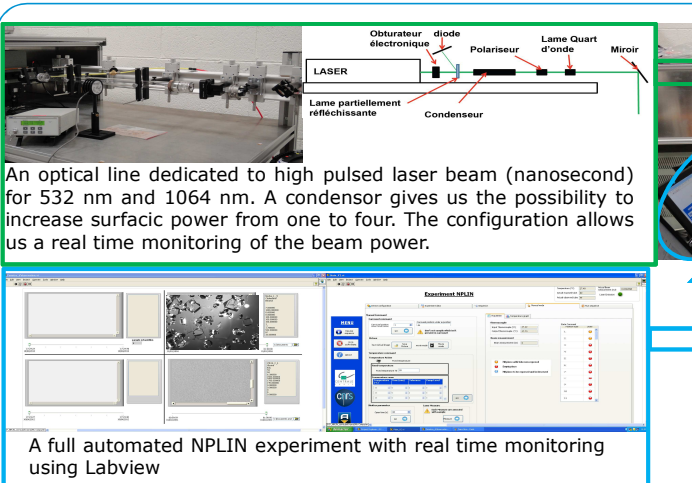
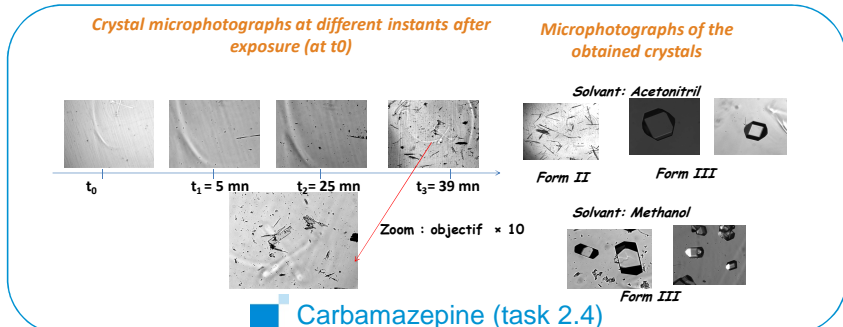
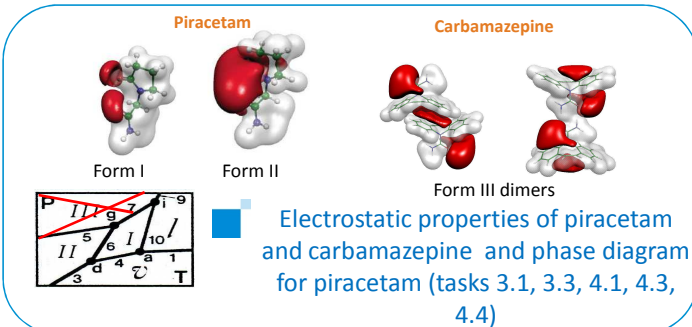
Context



$$N(\alpha_{\text{parallèle}} - \alpha_{\text{perpendiculaire}})^2 = 45\epsilon_0 n_0 K_b T$$


- Co-existence of clusters of polarisability tensors of different symmetry: « disk-like » or « rod-like »
- Role of the induced dipolar moment depending on the clusters type
- Dipole moment induced of the cluster aligned itself on the laser polarization. Minimization of energy.

Possible mechanism : Kerr effect



Conclusions and apertures

- The device allows us to expose and survey till 90 samples during several days and it is fully automated.
- In a near future, the device will permit to study solubility according to temperature and to determine metastable zone.
- This device can probe a huge number of solutions using NPLIN method.
- Interesting results come from Carbamazepine, Glycine and glutamic acid.



NPLIN new experimental device (task 2.1, 2.2, 2.3)

Production scientifique (publications, brevets)

- B. CLAIR, A. IKNI, H. YANG, F. DUMAS, P. SCOUFFLAIRE, A. SPASOJEVIC – DE BIRÉ « Non Photochemical Light Induced Nucleation. A tool to crystallize polymorphs on demand ? » CPOSS meeting, London (UK), Grande-Bretagne, 30 mars 2011
- A. IKNI, B. CLAIR, H. YANG, F. DUMAS, P. SCOUFFLAIRE, A. SPASOJEVIC – DE BIRÉ « Non Photochemical Light Induced Nucleation. A tool to crystallize polymorphs on demand ? » IV congrès algérien de cristallographie, Kenchela, (Algérie), 14-16 mai 2011
- A. SPASOJEVIC – DE BIRÉ, A. IKNI, B. CLAIR, N. GUILBIN, I. KORNEV, X. SHI, J. LONG, H. YANG, W. LI, M. MENDRE, P. SCOUFFLAIRE, E. JEAN-BART, J. BEAUNIER, F. SAIG, P. ESPEAU, Y. CORVIS, C. ALZINA, N-E GHERMANI, N. EL HASSAN, F. DUMAS, S. VEESLER, Z. HAMMADI « Non Photochemical Light Induced Nucleation » Journées nationales en nanosciences et nanotechnologies, Strasbourg (France) 7 – 9 novembre 2011
- A. SPASOJEVIC – DE BIRÉ, A. IKNI, B. CLAIR, F. DUMAS, P. SCOUFFLAIRE, « Non Photochemical Light Induced Nucleation (NPLIN). A tool to crystallize polymorphs on demand ? Application to carbamazepine » GFCC-2011, Paris, novembre 2011
- B. CLAIR, A. IKNI, P. SCOUFFLAIRE, S. VEESLER, A. SPASOJEVIC – DE BIRÉ « A Method to probe NPLIN on glycine and histidine : a new path to understand nucleation » CPOSS meeting, London (UK), 3 avril 2012
- A. IKNI, B. CLAIR, P. SCOUFFLAIRE, S. VEESLER, A. SPASOJEVIC – DE BIRÉ, « Non Photochemical Light Induced Nucleation (NPLIN). Application to carbamazepine (CBZ) » CPOSS meeting, London (UK), 3 avril 2012
- A. SPASOJEVIC – DE BIRÉ, P. SCOUFFLAIRE, A. IKNI, B. CLAIR, E. JEAN-BART, J. BEAUNIER, F. SAIG « New automated experimental devices for Non Photochemical Light Induced Nucleation » CPOSS meeting, London (UK), 3 avril 2012
- B. CLAIR, A. IKNI, P. SCOUFFLAIRE, A. SPASOJEVIC – DE BIRÉ, « NPLIN of glycine and carbamazepine » Serbian Crystallographic Meeting, Bela Crkva (Serbie), 31 mai – 2 juin 2012
- A. IKNI, B. CLAIR, P. SCOUFFLAIRE, A. SPASOJEVIC – DE BIRÉ, « NonPhotochemical Light Induced Nucleation of Carbamazepine in Polar protic and aprotic solvents » 2012 Collaborative Conference on Crystal Growth, Orlando (USA), 11-14 décembre 2012
- B. CLAIR, A. IKNI, P. SCOUFFLAIRE, A. SPASOJEVIC – DE BIRÉ, « Understanding photophysical effects : NPLIN on glycine and L- glutamic acid » 2012 Collaborative Conference on Crystal Growth, Orlando (USA), 11-14 décembre 2012

CONTACT
 Anne.spasojevic@ecp.fr
 Philippe.scoufflaire@eco.fr
 Philippe.espeau@parisdescartes.fr
 Nour.eddine.ghermani@u-psud.fr

