



Luminescence Nanothermometry of alkyl-capped Silicon nanoparticles dispersed in squalane

H Hajjaji, Yuri Ryabchikov, S Alekseev, G Guillot, G Bremond, Nicholas Blanchard, P Vergne, D Philippon, J.-M Bluet

► To cite this version:

H Hajjaji, Yuri Ryabchikov, S Alekseev, G Guillot, G Bremond, et al.. Luminescence Nanothermometry of alkyl-capped Silicon nanoparticles dispersed in squalane. International conference on small science (ICSS 2013), from 15 to 18 December 2013, Las Vegas, NV, USA., Dec 2013, Las Vegas, United States. hal-01154671

HAL Id: hal-01154671

<https://hal.science/hal-01154671>

Submitted on 27 May 2015

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

International conference on small science (ICSS 2013), from 15 to 18 December 2013, Las Vegas, NV, USA.

Luminescence Nanothermometry of alkyl-capped Silicon nanoparticles dispersed in squalane

H. Hajjaji¹, Y. Ryabchikov¹, S. Alekseev², G. Guillot¹, G. Bremond¹, N. Blanchard³, P. Vergne⁴, D. Philippon⁴ and J.-M. Bluet¹

The goal of this study is to use Silicon nanoparticles (Si NPs) as a nanothermometer in non-polar liquids like lubricants. Toward this end, Si NPs was synthesized by the electrochemical anodization of a bulk material. Modification of their surface chemistry by hydrosilylation reaction was then realized in order to disperse them homogeneously in non-polar liquids. The centrifugation process of the NPs in solution was optimized in order to obtain a single size distribution. Characterization of these NPs by TEM, and FTIR spectroscopy will be presented. The NPs fluorescence properties were studied using steady state and time resolved photoluminescence. Fig 1 shows the spectral evolution with temperature from 273 K to 373 K of alkyl-terminated Si NPs dispersed in squalane. The different mechanisms responsible for the spectral temperature variation will be discussed in order to explain the important thermal sensitivity of the silicon nanoparticles photoluminescence. Their application as nanothermometers is proposed.

¹ Université de Lyon, CNRS, UMR 5270, INSA-Lyon, INL, F-69621 Villeurbanne, France

Email: hamza.hajjaji@insa-lyon.fr

² Chemistry Faculty, Kiev National Taras Shevchenko University, 01601 Kiev, Ukraine

³ Université de Lyon, CNRS, UMR 5306, Université Claude Bernard Lyon1, ILM, F-69622 Villeurbanne, France

⁴ Université de Lyon, CNRS, UMR5259, INSA-Lyon, LaMCoS, F-69621 Villeurbanne, France