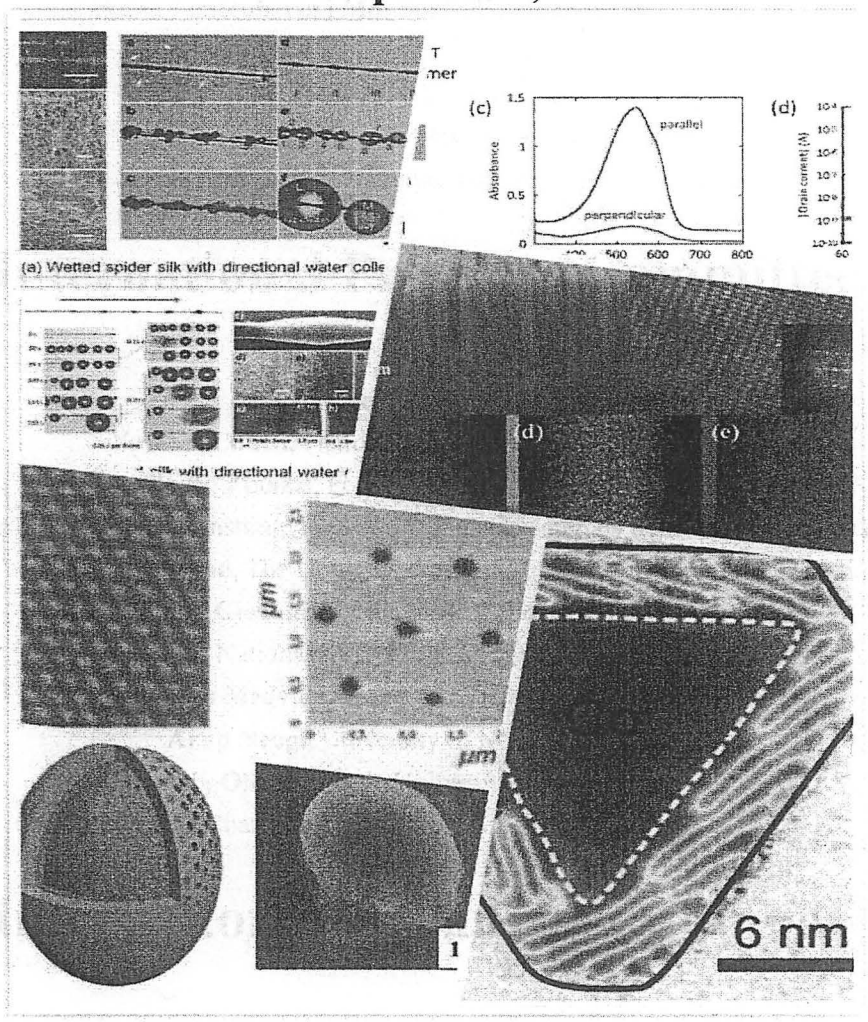
# Energy Materials Nanotechnology Open Access Week

# Program&Abstracts

## Jinjiang Generation International Hotel, Chengdu, China
## Sept. 22-25, 2014





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|---|---|---|
| 13:30-13:55 PM | A10: Multilayered Co alloy nitride granular films for high frequency electromagnetic application | **Hanae Kijima**<br>Tohoku University, Japan<br>P26 |
| 13:55 -14:10 PM | A11: Measurement of ac hysteresis curves of magnetic nanoparticles for biomedical applications | **Yasushi Takemura**<br>Yokohama National University, Japan<br>P28 |
| 14:10 -14:35 PM | A12: Size Dependent Magnetism in $FeO/Fe_3O_4$ Core/Shell Nanoparticles | **Alejandro Gomez Roca**<br>The Catalan Institute of Nanoscience and Nanotechnology, Spain<br>P30 |
| 14:35 -15:00 PM | A13: Colloidal Hybrid Nanoparticles $Fe_3O_4$-Ag with Tunable Ag Domains and Magnetic Properties | **Yiwu Mao**<br>China Academy of Engineering Physics, China<br>P32 |
| 15:00-15:25 PM | A14: Magnetic Topological Insulators: Magnetisms and Physics | **Liang He**<br>Nanjing University, China<br>P34 |
| 15:25-15:55 PM | Session Break | |
| **Session: Polymer Materials and Engineering I Chair: Nigel Clarke** | | |
| 15:55-16:10 PM | A15: Selective dispersion of large-diameter single-wall carbon nanotubes through polymer wrapping | **Masayoshi Tange**<br>National Institute of Advanced Industrial Science and Technology (AIST) , Japan<br>P35 |
| 16:10-16:35 PM | A16: Bio-inspored Multi-gradient Surface Materials with Water Collection | **Yongmei Zheng**<br>Beihang University, China<br>P37 |
| 16:35-17:00 PM | A17: Novel characterization methods and applications for photopolymers | **Sergi Gallego**<br>University of Alicante, Spain<br>P49 |
| 17:00-17:25PM | A18: Laser nanostructuring of polymers | **Nikita Bityurin**<br>Institute of Applied Physics RAS, Russia<br>P41 |
| 17:25-17:50 PM | A19: Interface Engineering in Organic/Polymer Solar Cells | **Junliang Yang**<br>Central South University, China<br>P43 |
| 18:00 PM | Dinner Social | |

## A17: Novel characterization methods and applications for photopolymers

S. Gallego[1], M. Ortuño[1], A. Márquez[1], J. Francés[1], I. Pascual[2], A. Beléndez[1]

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Photopolymer materials enable modulation of the material's permittivity and thickness, they are self processing, layers with a wide range of thicknesses and properties can be fabricated, they present low scattering and are reasonably cheap. Altogether makes photopolymers a versatile and advantageous material to fabricate diffractive optical elements (DOE) and to store holograms. The material response depends on many parameters. When all of them are accurately determined the material behavior can be modeled, enabling to find easily the optimum schedule to multiplex many holograms, in holographic memories, or the intensity distribution to obtain the desired diffractive optical element with the required relief structure or refractive index distribution. In this work we present the way to characterize and model different types of photopolymers for different applications. We propose interferometric (Figure 1), diffractive and spectrometric techniques for the characterization in real time of the index, thickness modulation, monomer diffusion, depth attenuation in photopolymers.

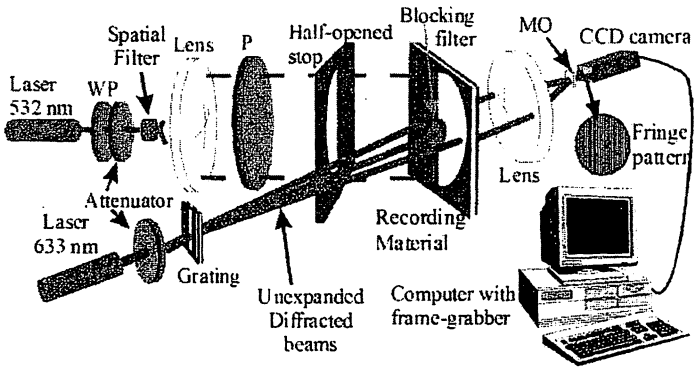


**Figure 1** Experimental set-up 1 for zero spatial frequency recording

There are many types of chemical formulation in order to achieve a competitive photopolymers, which have advantages and disadvantages. Thus, in order to design a particular photopolymer formulation we have to give priority some of the characteristics over the others. In this work we report experiment with different families of photopolymers. Firstly we present the deeply studied formulation based on polyvinyl alcohol acrylamide (PVA/AA)[1], this photopolymer present very interesting holographic behavior for different applications, nevertheless also present high toxicity. Then we have patented a new environmental composition called biophotopol [2], where holograms can be recorded with high quality. On the other hand in the classical compositions can be added dispersed liquid crystal molecules to obtain a photopolymers with tunable properties (H-PDLC) [3] and finally we show as this method can be partially applied for the photopolymer commercialized by Bayer-Material Science [4], for this last composition the measure of the shrinkage cannot be directly measured due to the reaction of the material when is exposed to the air. As result of this characterization method

we can obtain the parameters obtained in diffusion models to predict the material behavior for different applications such as holographic data storage.

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1. S. Gallego, A. Márquez, S. Marini, E. Fernández, M. Ortuño, and I. Pascual, *Opt. Express* **17**, 18279 (2009).
2. S. Gallego, A. Márquez, M. Ortuño, S. Marini and J. Francés, *Opt. Materials* **33**, 531 (2010).
3. Y. J Liu, X.W. Sun, *Adv. Optoelectron.* **2008**, 52, (2008).
4. M. R. Gleeson, J. T. Sheridan, F. Bruder, T. Rölle, H. Berneth, M. Weiser, and T. Fäcke, *Opt. Express* **19**, 26325 (2011).