Modification of Metal Surfaces by Optically Active [7]Helicene Derivatives for Molecular Sensing

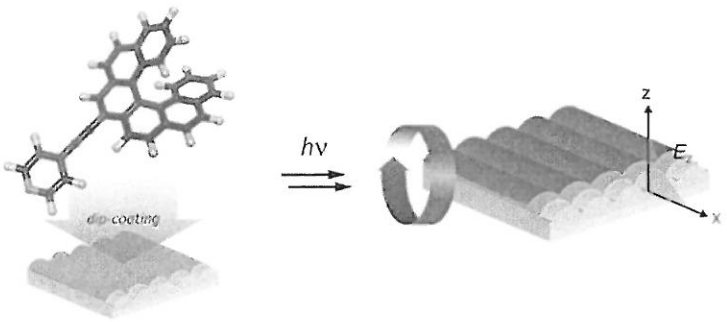
Hana Walaská,[1,2] Yevgeniya Kalachyova,[2] Roman Elashnikov,[2] Jan Storch,[1] Jaroslav Žádný,[1] Oleksiy Lyutakov*[,2]

[1]*Institute of Chemical Process Fundamentals of the CAS, v. v. i., Rozvojová 1/135, Prague 6, 165 02, Czech Republic,* [2]*Department of Solid State Engineering, UCT Prague, Technická 5, Prague 6, 166 28, Czech Republic*
e-mail: walaskah@vscht.cz

Helicenes and their functional layers have a great application potential in many fields of research due to their unique electronic and chiroptical properties [1]. Although they were successfully applied in molecular recognition [2] and sensing [3], their use in surface plasmon polariton-based detection is exceptional indeed.

With regard to above mentioned fact, new derivatives of 9-(pyridylethynyl)[7]helicenes were firstly prepared and fully characterized in this study. Consequently, they were successfully separated to their (*P*)- and (*M*)-enantiomers using a preparative HPLC with chiral stationary phase. These optical antipodes were advantageously used for modification of silver plasmon active nanogratings suitable for a SERS-based detection of (bio)molecules. Properties of such nanostructures were studied using different spectro- and microscopic techniques. As proved by UV-Vis spectrometry, a change of plasmon resonance wavelength position and intensity was observed and indicated the appearance of chiral surface plasmon polarization (Fig. 1).

Fig. 1



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1 Gingras, M. *Chem. Soc. Rev.* **2013**, 42, 1051.
2 Weix, D. J.; Dreher, S. D.; Katz, T. J. *J. Am. Chem. Soc.* **2000**, *122*, 10027.
3 Storch, J.; Žádný, J.; Strašák, T.; Kubala, M.; Sýkora, J.; Dušek, M.; Církva, V.; Matějka, P.; Krbal, M.; Vacek, J. *Chem. Eur. J.* **2015**, *21*, 2343.