

Multifunctional 2D materials for cancer therapy and bioimaging

Alberto Bianco

CNRS, Immunology, Immunopathology and Therapeutic Chemistry, UPR3572, ISIS, University of Strasbourg, Strasbourg, France

a.bianco@ibmc-cnrs.unistra.fr

Two-dimensional materials are considered unique systems for many applications in different fields including biomedicine [1, 2]. They are offering the possibility of original chemical functionalization and design of complex multifunctional systems that allow further their exploitation in therapy, imaging and diagnosis [2]. In this webinar, I will present the chemical strategies to functionalize graphene and other 2D nanomaterials with appropriate functional groups and therapeutic molecules in view of their biomedical applications [3-6]. I will present few examples of their use in cancer therapy and imaging [7-10]. I will also describe how it is possible to enhance the biodegradability and tune the toxic effects of these different materials [11, 12].

REFERENCES

- [1] Martin, C., Kostarelos, K., Prato M., Bianco, A. *Chem. Commun.* 55 (2019) 5540-5546.
- [2] Reina, G., González-Domínguez, J. M., Criado, A., Vázquez, E., Bianco, A., Prato, M. *Chem. Soc. Rev.* 46 (2017) 4400-4416.
- [3] Vacchi, I. A.; Spinato, C.; Raya, J.; Bianco, A.; Ménard-Moyon, C. *Nanoscale*, 8 (2016) 13714-13721.
- [4] Vacchi, I. A.; Raya, J.; Bianco, A.; Ménard-Moyon, C. *2D Mater.*, 5 (2018) 035037.
- [5] Guo, S.; Nishina, Y.; Bianco, A.; Ménard-Moyon, C. *Angew. Chem. Int. Ed.*, 59 (2020) 1542-1547.
- [6] Lucherelli, M. A.; Raya, J.; Edlhalhammer, K. F.; Hauke, F.; Hirsch, A.; Abellán, G.; Bianco, A. *Chem. Eur. J.*, 25 (2019) 13218-13223.
- [7] Reina, G., Ruiz, A., Murera, D., Nishina, Y., Bianco, A. *ACS Appl. Mater. Interfaces* 11 (2019) 7695-7702.
- [8] Lucherelli, M.A., Yu, Y., Reina, G., Abellán, G., Miyako, E., Bianco, A. *Angew. Chem. Int. Ed.*, 59 (2020) doi:10.1002/anie.201916112.
- [9] Martín, C., Ruiz, A., Keshavan, S., Reina, G., Murera, D., Nishina, Y., Fadeel, B., Bianco, A. 25 (2019) 1901761.
- [10] Russier, J.; Léon, V.; Orecchioni, M.; Hirata, E.; Viridis, P.; Fozza, C.; Sgarrella, F.; Prato, M.; Vazquez, E.; Bianco, A.; Delogu, L. G. *Angew. Chem. Int. Ed.*, 56 (2017) 3014-3019.
- [11] Kurapati, R.; Mukherjee, S. P.; Martín C.; Bepete, G.; Vazquez, E.; Pénicaud, A.; Fadeel, B.; Bianco, A. *Angew. Chem. Int. Ed.*, 57 (2018), 11722-11727.
- [12] Kurapati, R.; Bonachera, F.; Russier, J.; Sureshbabu, A. R.; Ménard-Moyon, C.; Kostarelos, K.; Bianco, A. Covalent chemical functionalization enhances the biodegradation of graphene oxide. *2D Mater.*, 5 (2018) 015020.