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A Supramolecular Nanoassembly of Lenvatinib and a Green Light-Activatable NO Releaser for Combined Chemo-Phototherapy

Francesca Laneri,[a,b] Nadia Licciardello,[a] Yota Suzuki,[c] Adriana Graziano,[a] Aurore Fraix,[a] and Salvatore Sortino[a].

[a] *PhotoChemLab, Department of Drug and Health Sciences, University of Catania, Viale Andrea Doria 6, I-95125, Catania, Italy.*

[b] *Department of Chemical Sciences, University of Catania, Viale Andrea Doria 6, I-95125, Catania, Italy.*

[c] *Department of Materials and Life Sciences, Faculty of Science and Technology, Sophia University, Tokyo (Japan)*

francesca.laneri@phd.unict.it

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In the last years, the combination between conventional chemotherapeutics with unconventional anticancer agents has received increasing attention. The final goal is to potentiate the therapeutic outcome due to additive/synergistic effects while minimizing the side-effects typical for chemodrugs.[1]. Among the "unconventional therapeutics", nitric oxide (NO) is very appealing. However, the biological effects of this free radical in cancer are strictly depending on its site of generation and doses. Therefore, light-activatable NO photodonors (NOPDs) are more intriguing than spontaneous NO releasers due to the very precise spatio-temporal control they offer.[2] Recently we have reported a combination of a polymeric blue light-activatable NO releaser with the chemotherapeutic Sorafenib.[3] In this contribution, we report an improvement of this work proposing a supramolecular nanoassembly based on a water-soluble cyclodextrins polymer and co-encapsulating a red fluorescent NO releaser activatable with the more biocompatible green-light and the chemotehrapeutic Lenvatinib, an antitumoral largely administered for hepatocellular and differentiated thyroid carcinoma treatment. The photophysical and photochemical properties of this novel macromolecular construct are illustrated and the biological tests on tumoral cell lines are reported.

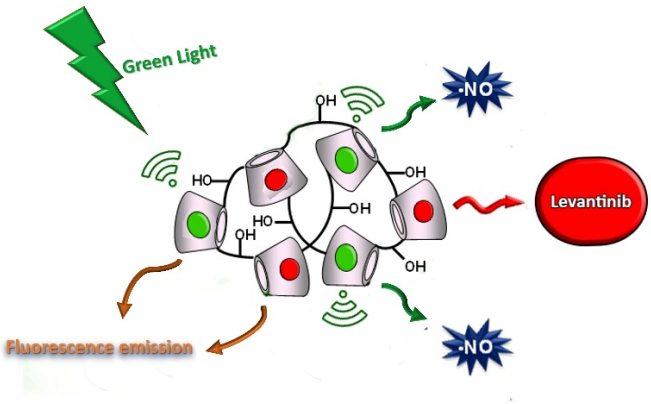

Fig. 1. *Schematic representation of the supramolecular construct.*

References:

[1] A. Fraix, N. Marino, S. Sortino, Phototherapeutic Release of Nitric Oxide with Engineered Nanoconstructs. in *Top Curr Chem*., Springer, **2016**, 370:225-57.

[2] S. Sortino, Photoactivated nanomaterials for biomedical release applications. *J Mater Chem*. **2011**, 22, 301-318.

[3] F. Laneri, ACE Graziano, M. Seggio, A. Fraix, S. Sortino et al. Enhancing the Anticancer Activity of Sorafenib through Its Combination with a Nitric Oxide Photodelivering & β-Cyclodextrin Polymer. *Molecules*. **2022,** 27. 1918.