# Annual Congress of the Italian Society of Photobiology – SIFB2019

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Italian National Research Council, Bologna
Institute of Organic Synthesis & Photoreactivity (ISOF)

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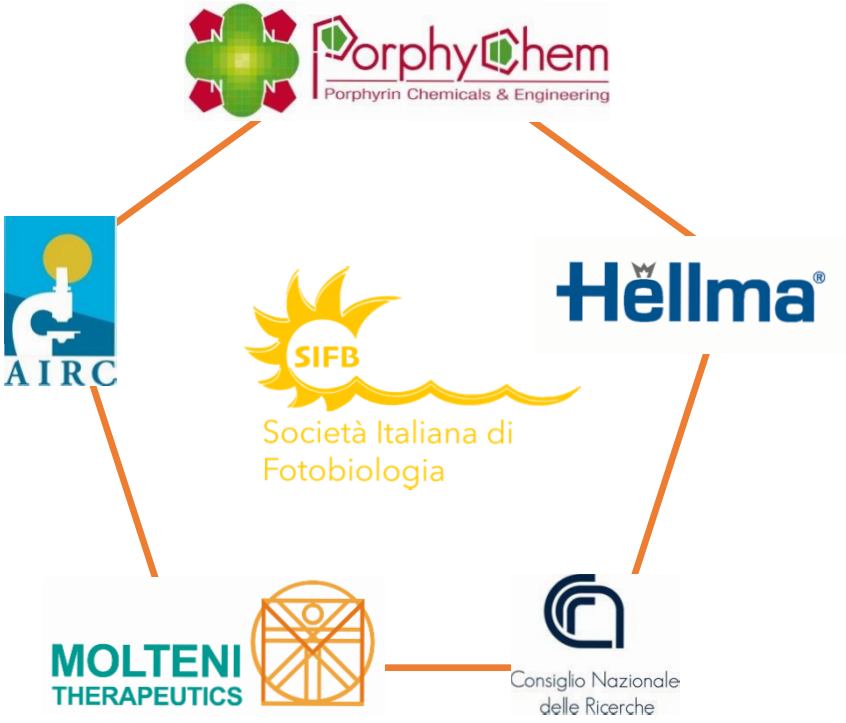

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# CONFERENCE PROGRAM

Legend:
PL: plenary; IC: invited communication; OC: oral communication; PC: poster communication

## OC2

# Nanocomplexes based on a cationic porphyrin and an anionic cyclodextrin with antimicrobial photodynamic properties

*Roberto Zagami,[1] James D. Pipkin,[2] Vince Antle,[2] Domenico Franco,[3] Laura De Plano,[3] Salvatore Patanè,[4] Salvatore Guglielmino,[3] Luigi Monsù Scolaro,[1,2,5] and Antonino Mazzaglia[1]*

[1] CNR-ISMN, c/o Dip. ChiBioFarAm, University of Messina, Viale F. Stagno d'Alcontres 31, 98166, Messina, Italy; [2] Ligand Pharmaceuticals Inc, San Diego, CA USA; [3] Dip. ChiBioFarAm, University of Messina, Viale F. Stagno d'Alcontres 31, 98166, Messina, Italy. [4]Dip. MIFT, Università di Messina, Viale F. Stagno d'Alcontres 31, 98166, Messina, Italy C.I.R.C.M.S.B., University of Messina, Messina, Italy.

Nowadays, novel less-expensive nanoformulations for *in situ*-controlled and safe delivery of photosensitiser (PS) against opportunistic pathogens in body-infections areas needs to be developed. Following our ongoing research on nanophototerapeutics [1-3], here we propose the design and characterization of a novel photosensitizing nanosystem based on the marketed cyclodextrin CAPTISOL® (sulphobutylether-beta-cyclodextrin, SBE-beta-CD) to fabricate efficient biocompatible systems for antimicrobial photodynamic therapy (aPDT). Firstly, interaction studies were carried out in order to investigate the complexation between CAPTISOL® with the tetracationic water soluble meso-tetrakis(N-methylpyridinium- 4-yl)porphine (TMPyP). Nanocomplexes based on CAPTISOL® and TMPyP ( NanophotoCapitsol) were prepared in aqueous media and characterized by complementary spectroscopy and microscopic tecniques such as UV/vis, fluorescence spectroscopy, atomic force microscopy ( AFM) and scanning-near field optical luminescence (SNOL), thus investigating complex stoichiometry, stability constant, photophysical and morphological properties. Furthermore size and ζ-potential were measured by Dynamic light scattering and Electrophoretic Light Scattering, respectively. Release and stability studies were performed in physiological conditions pointed out the role of CAPTISOL® to sustain the PS release. Finally, photoantimicrobial activity of the NanophotoCapitisol *vs* free porphyrin were investigated against Gram-negative *Pseudomonas aeruginosa* ATCC 27853, by showing as the proposed nanosystems can control along the time the release of porphyrin to photokill Gram-negative bacterial cells.

[1] Castriciano, M.A., Zagami, R., Casaletto M. P., Martel. B., Trapani, M., Romeo, A., Villari, V., Sciortino, M. T., Grasso, L., Gugliemino, S., Monsù Scolaro, L., Mazzaglia A. (2017) *Bioamacromolecules*, 18, 1134.
[2] Scala, A., Piperno, A., Grassi, G., Monsù Scolaro, L, Mazzaglia, A. (2017) in Nanoconstructs Based on Cyclodextrins for Antimicrobial Applications. In Nano- and Microscale Drug Delivery Systems, Grumezescu, A. M., Ed. Elsevier: pp 229-244.
[3] Zagami,R., Sortino, G., Caruso, E., Malacarne, M., Banfi, S., Patanè,S., Monsù Scolaro,L. Mazzaglia, A. (2018) *Langmuir*, 34, 8639.

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