

Resources

Partner Profile – Photodynamic and Photochemical Therapeutics for Infectious Disease and Oncology

The Spangler Lab provides end-to-end expertise from molecular design to preclinical validation of light-activated therapeutics, with direct relevance to Horizon Europe Work Program Cluster 1 – Health. Guided by Chesbrough's concept of open innovation^[1], the lab engages in structured knowledge exchange with academic, industrial, and societal partners while ensuring strategic IP management and sustainable exploitation pathways.

Scientific Expertise & Core Know-how of the Spangler Lab

The Spangler Lab combines medicinal chemistry, photophysics and translational research to advance light-activated therapeutics from early molecular concepts towards preclinical proof-of-concept. Our expertise is particularly suited to projects requiring innovative therapeutic modalities, difficult biological microenvironments, and clear progression along the preclinical development pathway.

- Design, synthesis and characterization of photosensitizers for photodynamic therapy (PDT) and photothermal therapy (PTT), including daylight-sensitive compounds
- Development of hypoxia-adapted phototherapeutics for challenging disease microenvironments
- Specialized focus on boron-based photosensitizers (boron dipyrromethens, AKA BODIPYs) for biomedical applications

Platforms & Infrastructure of the Spangler Lab

*The Spangler Lab operates an integrated set of chemical, computational, and biological platforms that enable rapid iteration from molecular design to functional in vitro validation, thereby supporting efficient progression in collaborative projects. The lab's infrastructures support activities typically spanning **TRL 2–4**, with clear pathways towards **TRL 5–6** through preclinical validation and GMP-aligned synthesis in collaboration with partners.*

- **Chemical synthesis & scale-up**
 - Proprietary BODIPY photosensitizer library (high light-to-dark toxicity ratios)
 - Automated lab robots for parallel synthesis
- **Structural & analytical characterizations**
 - Photophysical spectroscopy (AvaLight Hal, multi-wavelength sources)
 - Single-crystal growth and solid-form screening

- X-ray diffraction (small-molecule 3D structures)
- HPLC method development (small molecules & metal-organic complexes)
- **Computational photochemistry**
 - Absorption wavelength prediction
 - Singlet–triplet energetics and T_1 accessibility
 - Heavy-atom and charge-transfer effect modelling
- **Biological evaluation**
 - In vitro assay platforms for light-based therapeutics

Role in Horizon Europe Projects

The Spangler Lab acts as a technology-driving and integration partner, translating advanced photosensitizer concepts into robust, preclinically validated therapeutic candidates.

- WP leadership (e.g. photosensitizer design, optimization, validation)
- Experimental work packages (PhD, postdoc, and advanced lab activities)
- Translational and validation partner, including access to ZIRP preclinical imaging facilities
- Proposal coordination or co-coordination
- Innovation & valorization: co-founding of spin-offs within Europe's leading pharma hub

Consortium Needs / Partner Requests

The Spangler Lab's philosophy is that partnerships are essential to advance promising photosensitizer candidates towards regulatory-compliant preclinical packages and, where relevant, first-in-human enabling studies.

- Access to general oncology, bacterial, and viral preclinical models (AMR pathogens such as MRSA, CRE, CRAB, etc.; viral pathogens relevant in HORIZON-HLTH-2026-01-DISEASE-04)
- Virology and infectious disease expertise, including AMR-relevant pathogens
- Access to and training in BSL-2/3/4 laboratories
- Regulatory and translational expertise (CMC, GMP readiness, clinical-enabling steps)
- CMC partners for GMP-compatible synthesis of photosensitizers

Bibliography

- [1] H. W. Chesbrough, *Open Innovation : The New Imperative for Creating and Profiting from Technology*, Harvard Business School Press, Boston, Mass., 2003.