



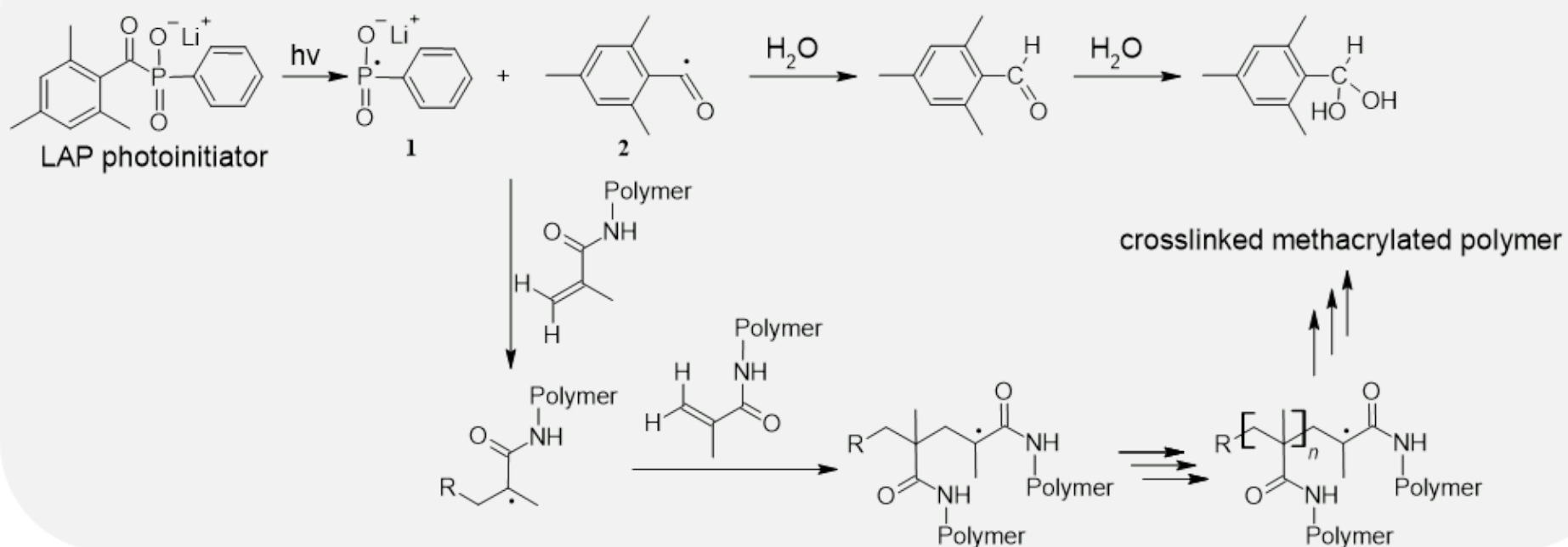
CleanCure™ bioinks

Next-generation photoinitiator-free hydrogels for safe and regulatory-compliant tissue engineering applications

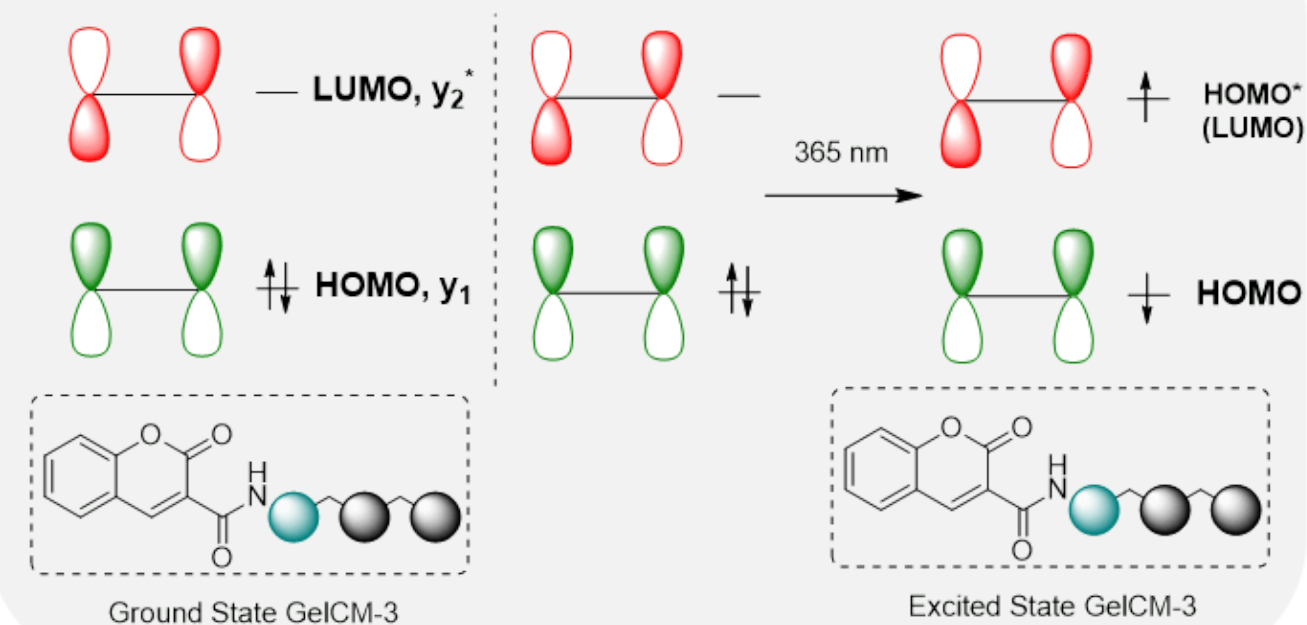
Sylwester Domański, Agnieszka Zakrzewska, Katarzyna Woźniak,
Marta Klak, Michał Wszola

CleanCure™ Technology

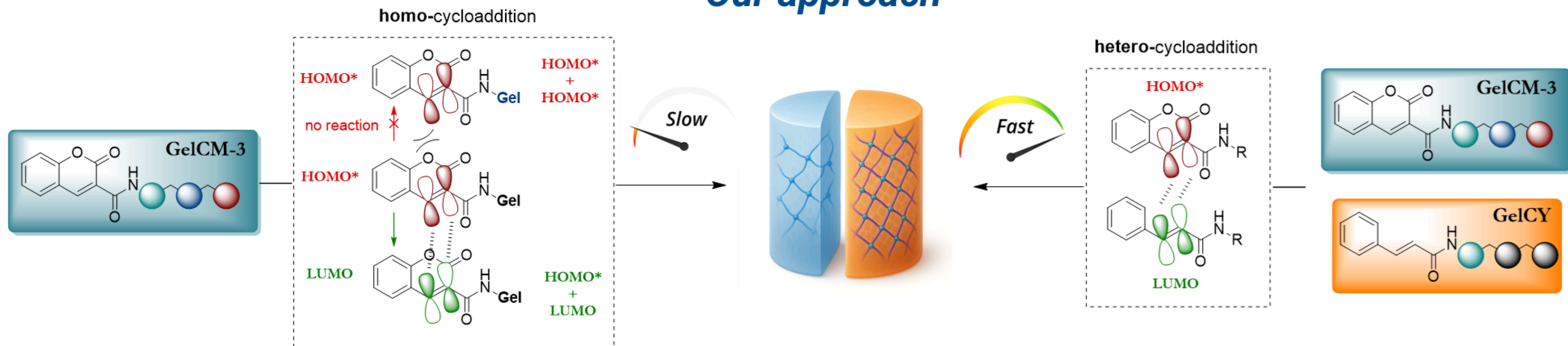
Common radical pathway



[2+2] cycloaddition



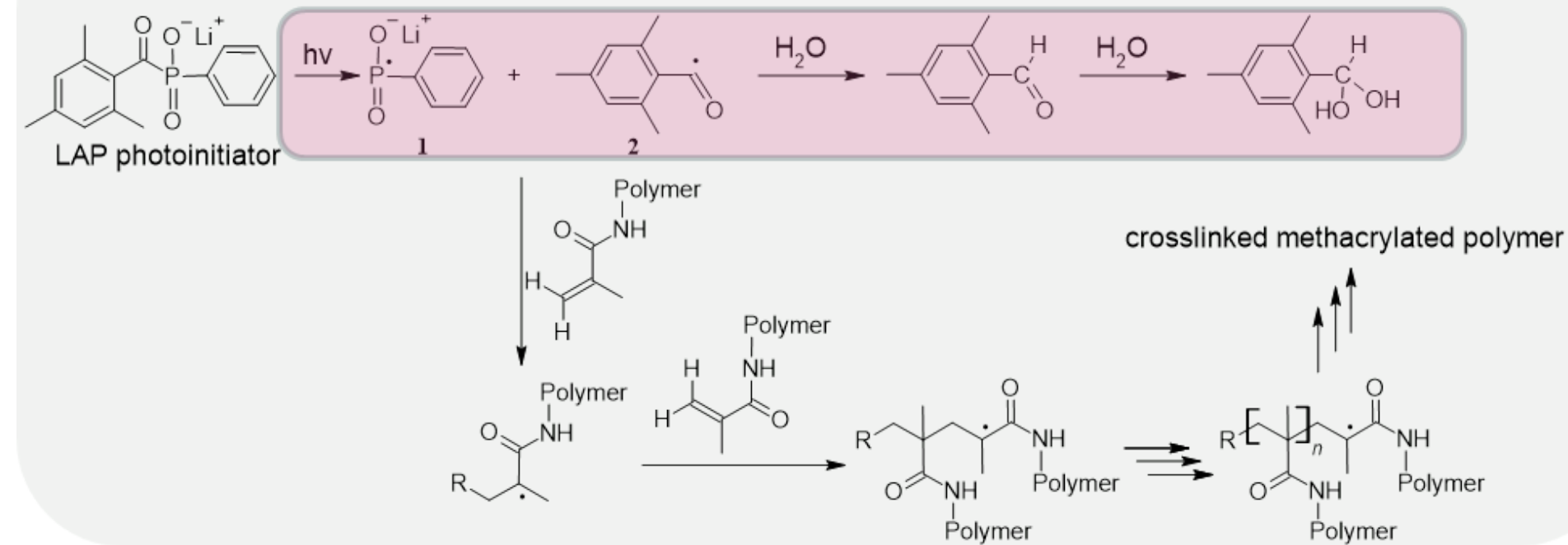
Our approach



CleanCure™ vs. radical pathway

Clinical regulation standpoint

Common radical pathway

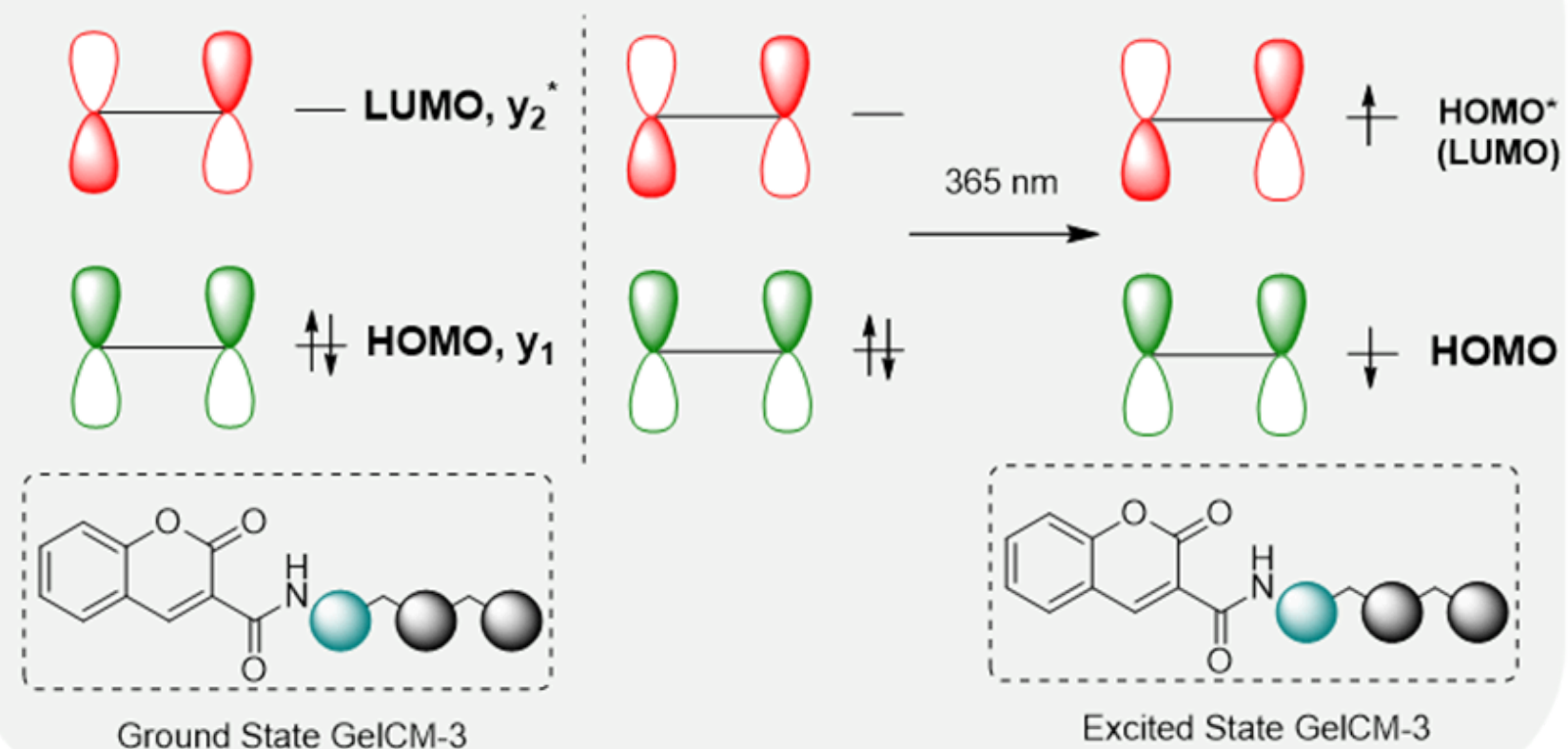


- ✓ **No cytotoxic photoinitiator**
- ✓ **No leachables**
- ✓ **Daylight-stable**
- ✓ **High-fidelity printing**
- ✓ **Cytocompatible**

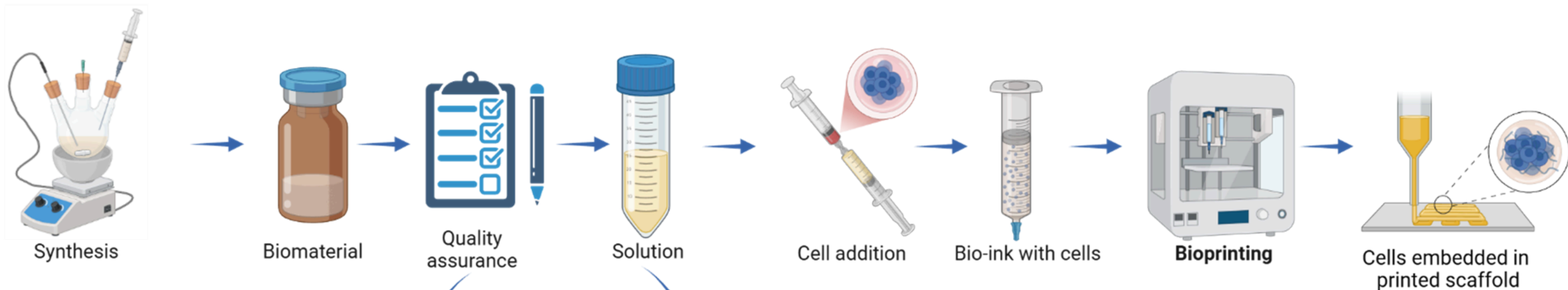


Vs.

[2+2] cycloaddition



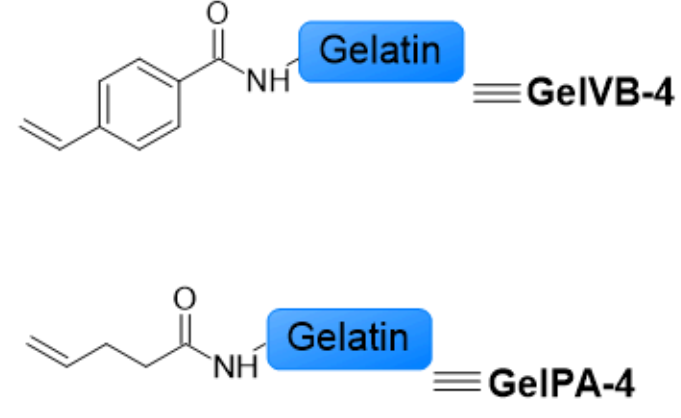
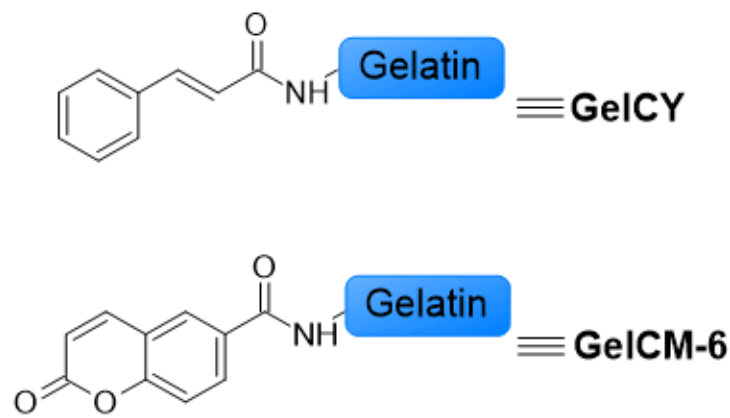
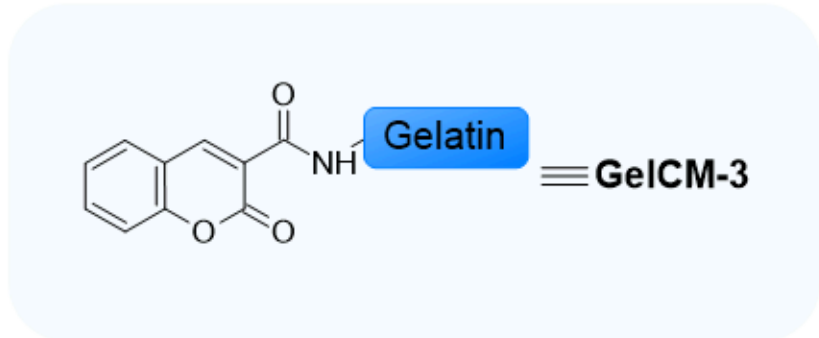
CleanCure™- *how does it work?*



- Degree of substitution
- Crosslinking ability
- UV-Vis and ¹H NMR analysis
- Rheological properties
- Printability
- Mechanical properties
- Degradation degree

Base biomaterial

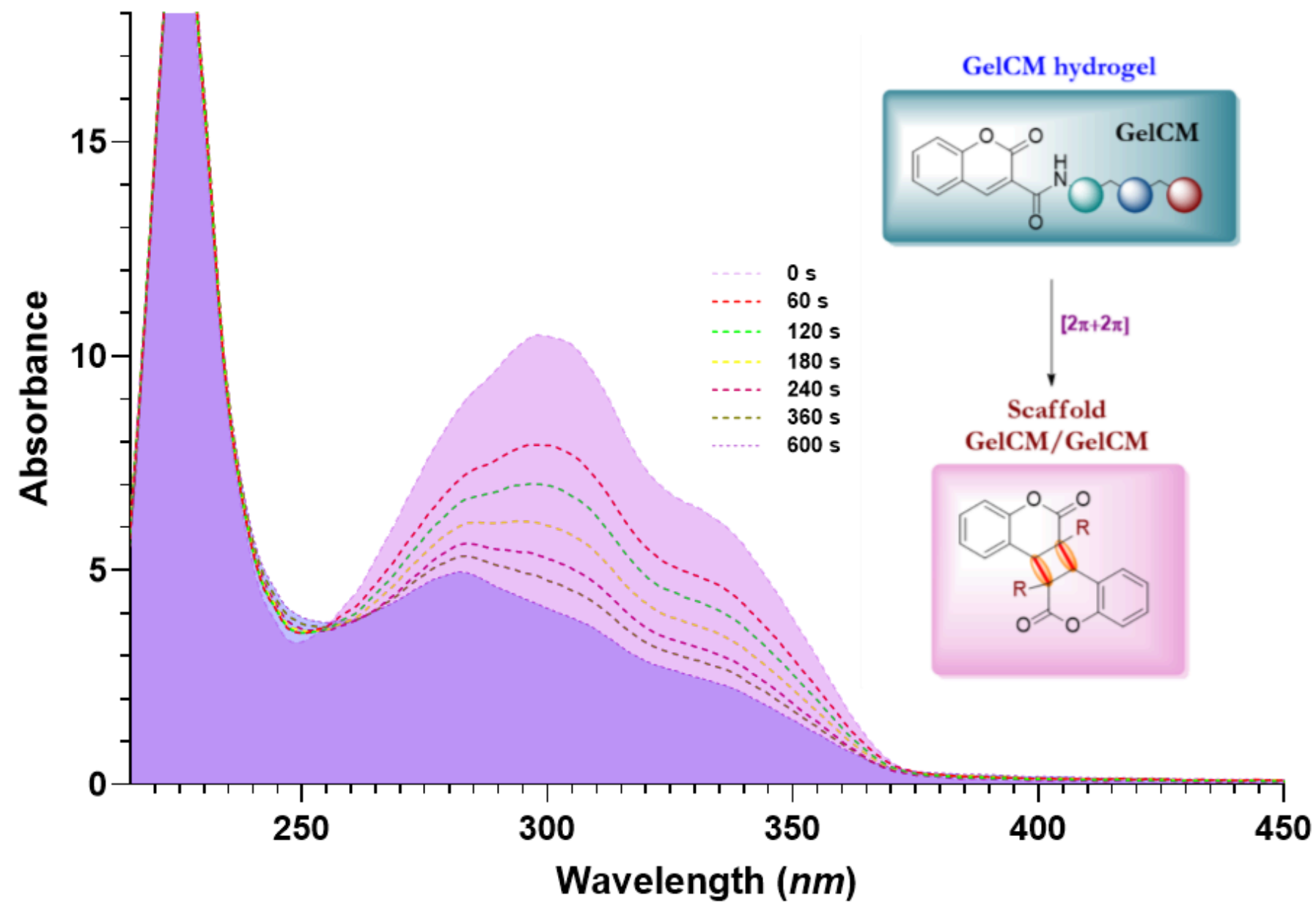
Additional biomaterials



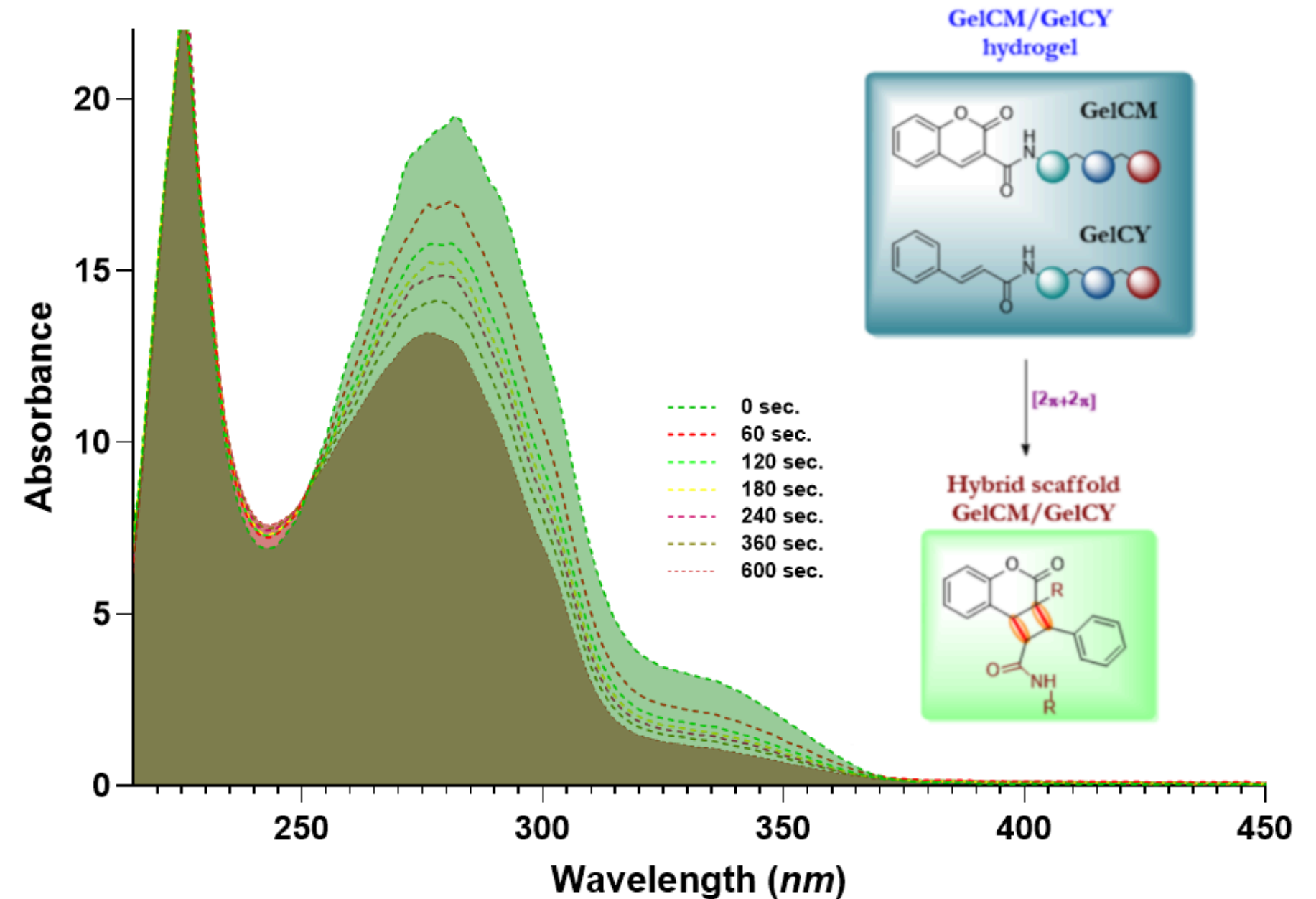
- No cytotoxic photoinitiator
- No leachables
- Day light stable
- itp

CleanCure™- crosslinking mechanism

Homo-crosslinking pathway

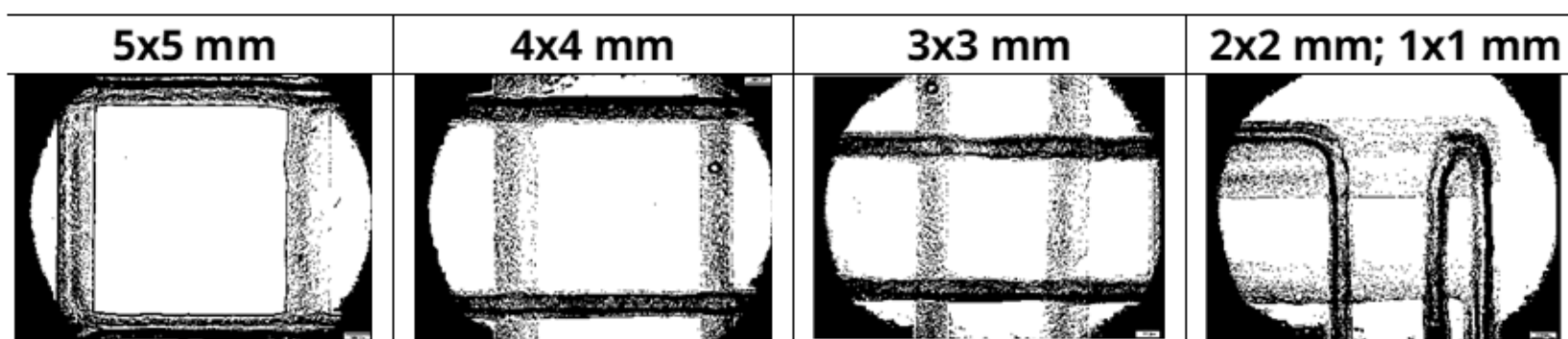
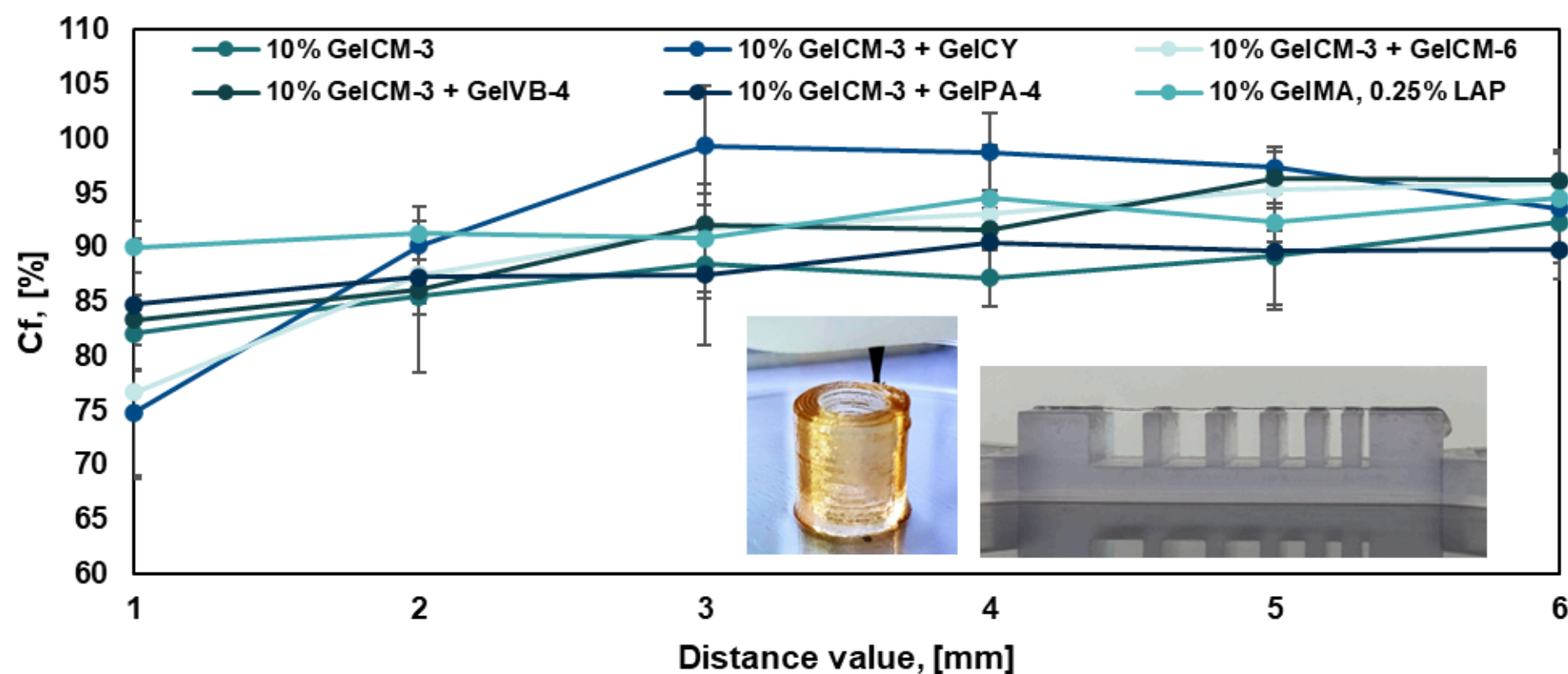
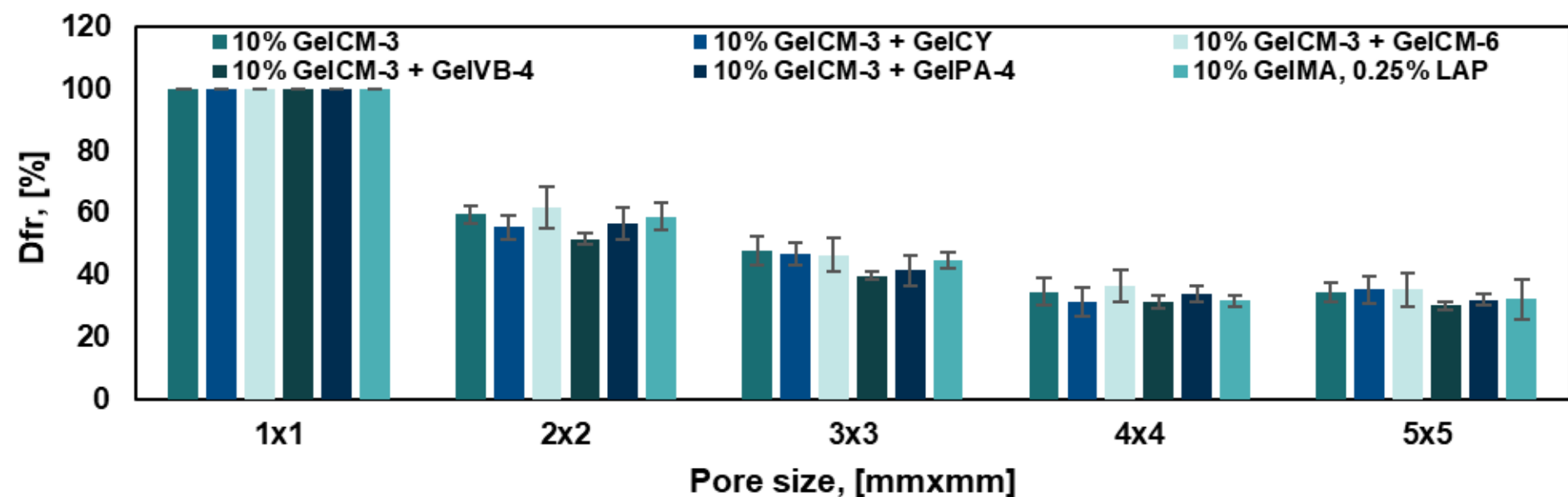
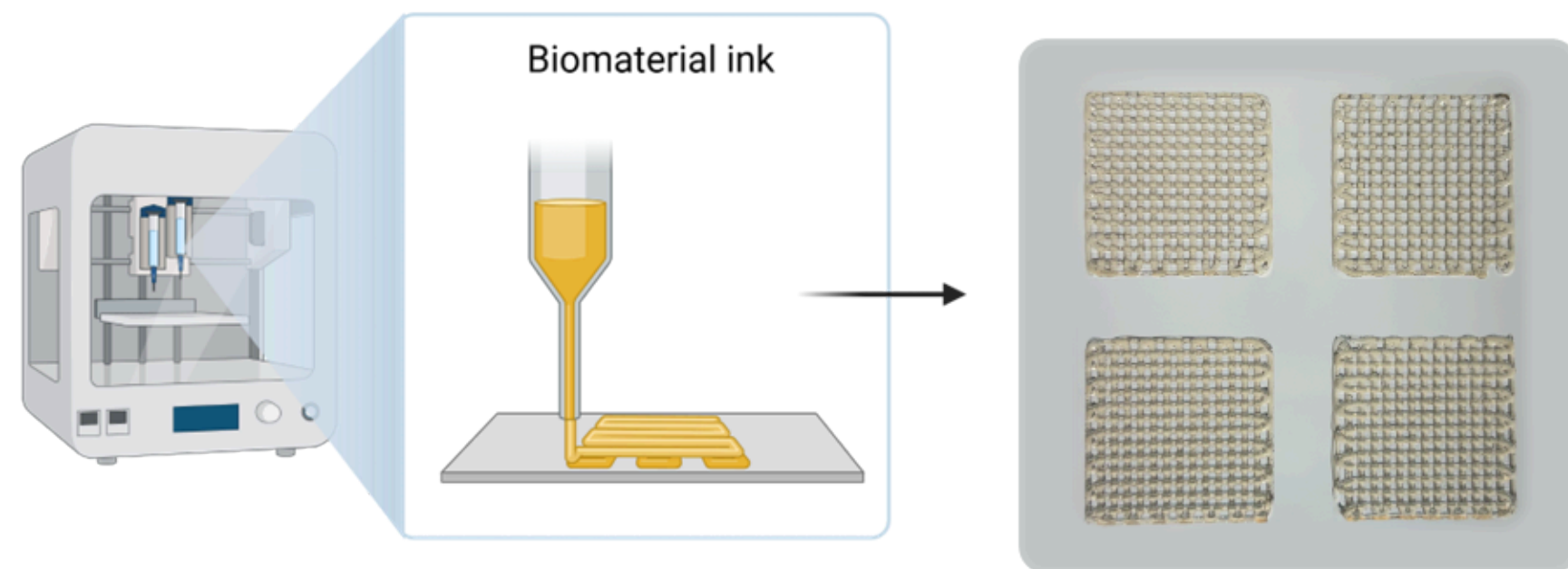
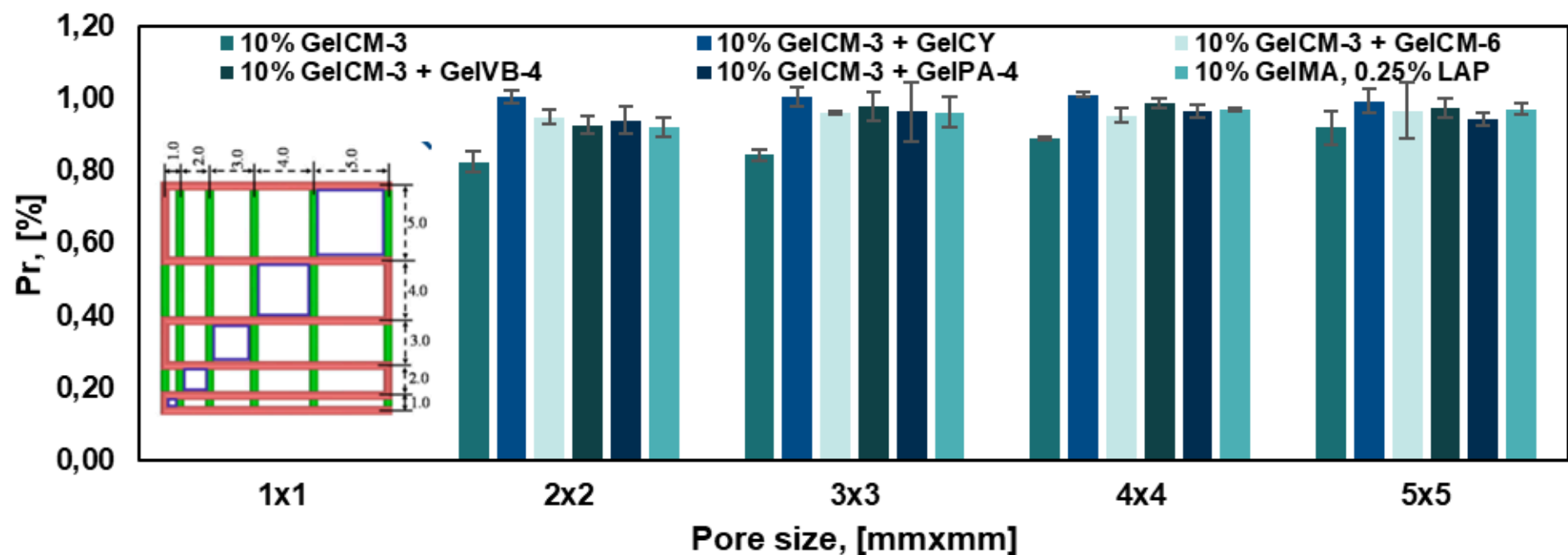


Hetero-crosslinking pathway



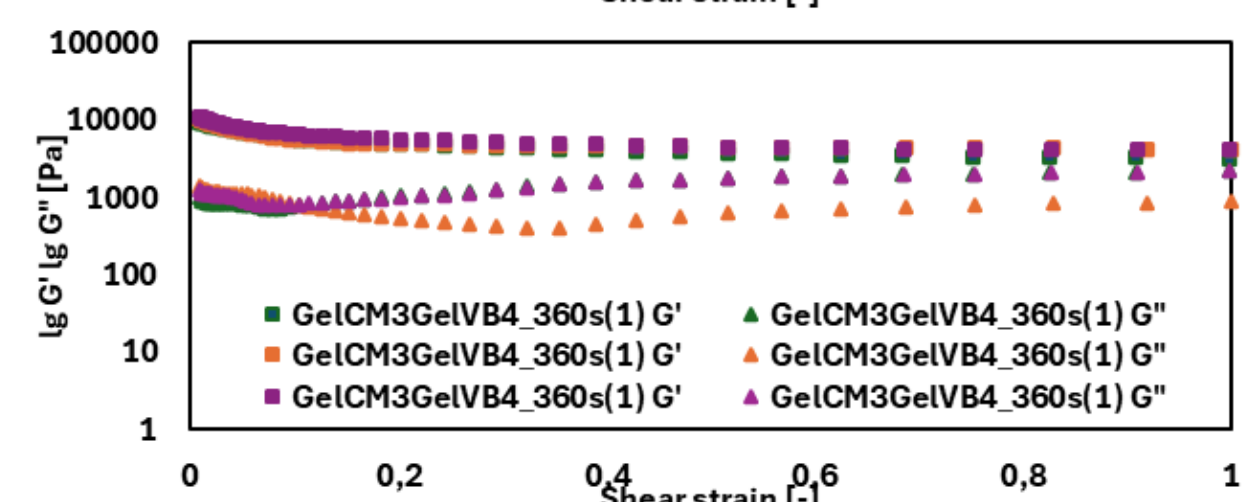
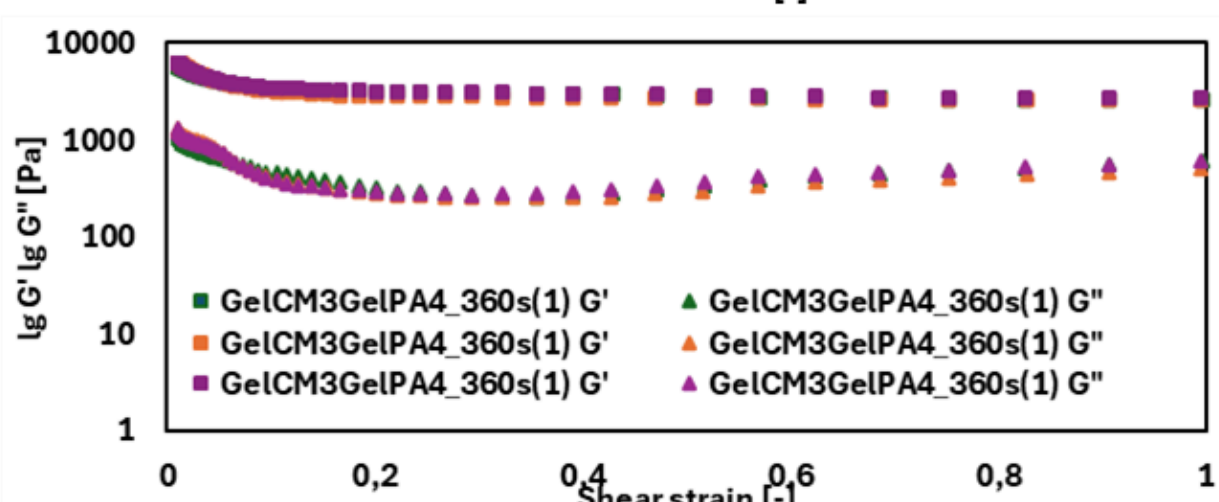
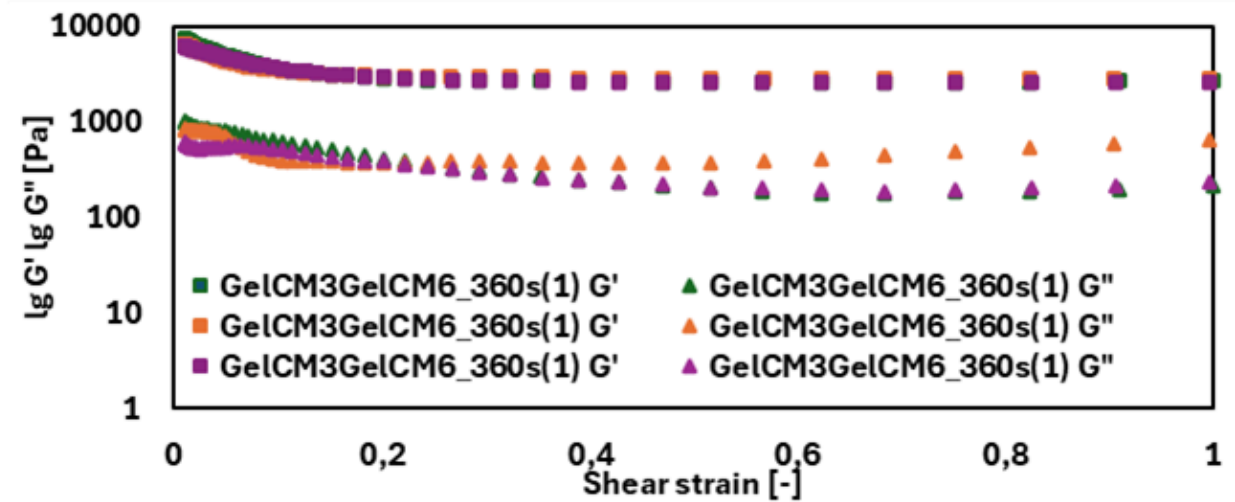
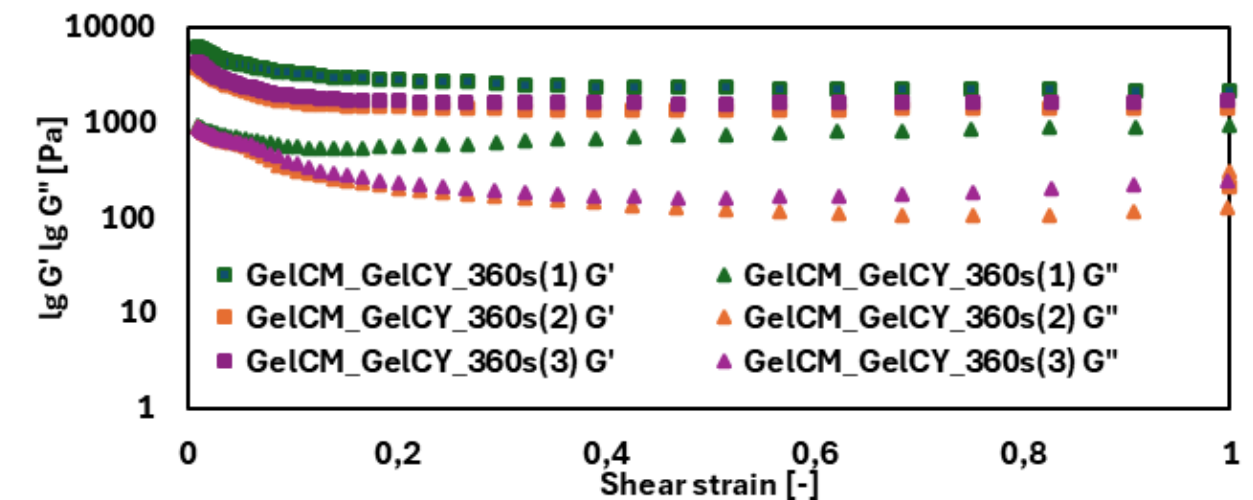
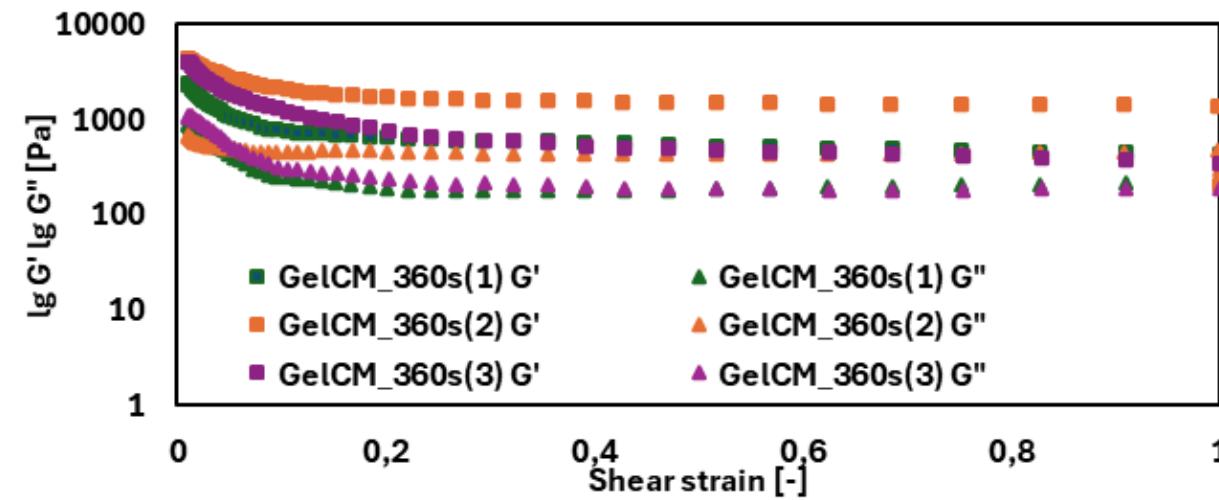
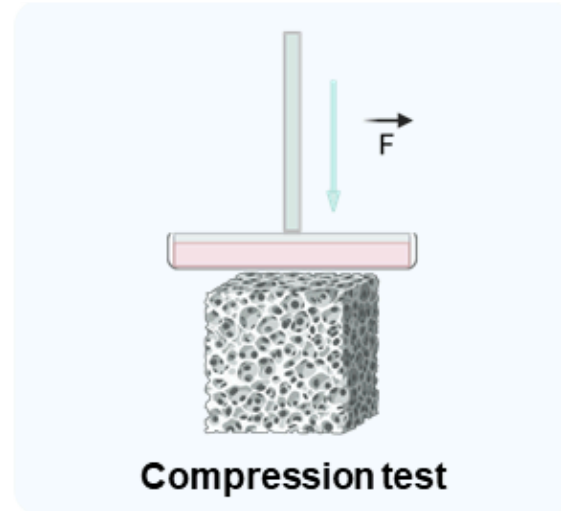
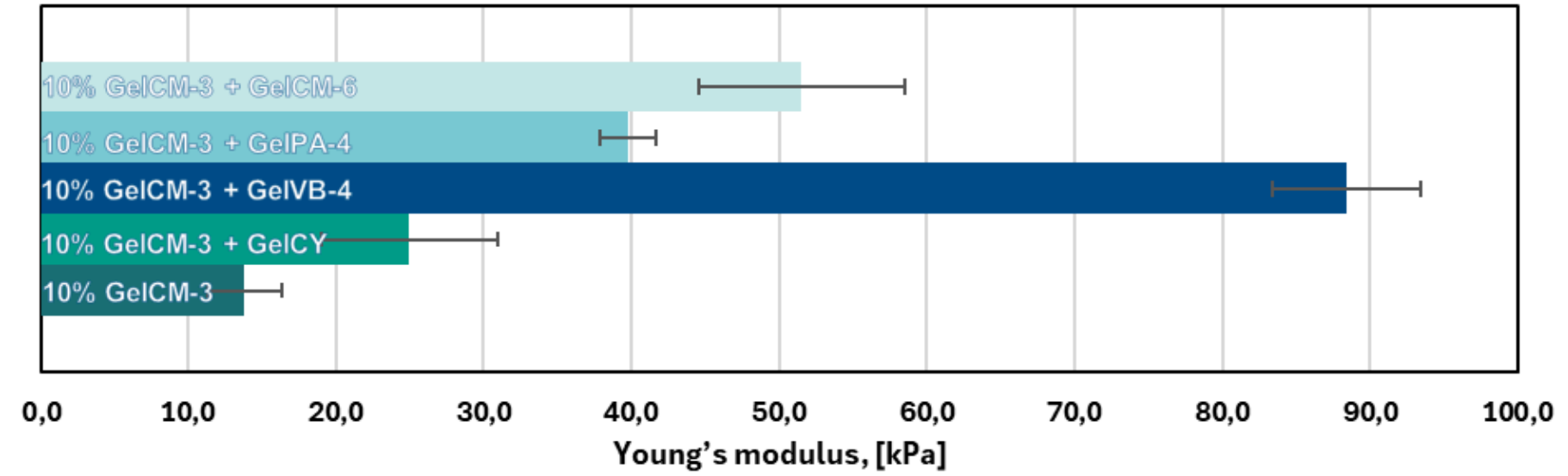
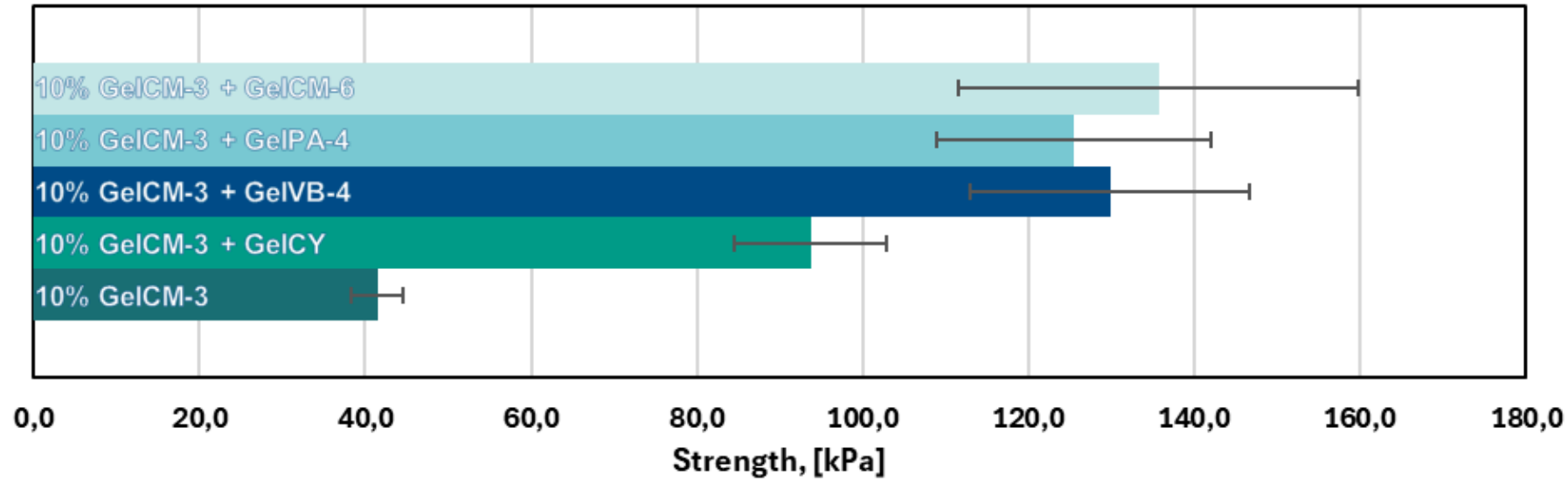
CleanCure™- X-series

mechanical properties



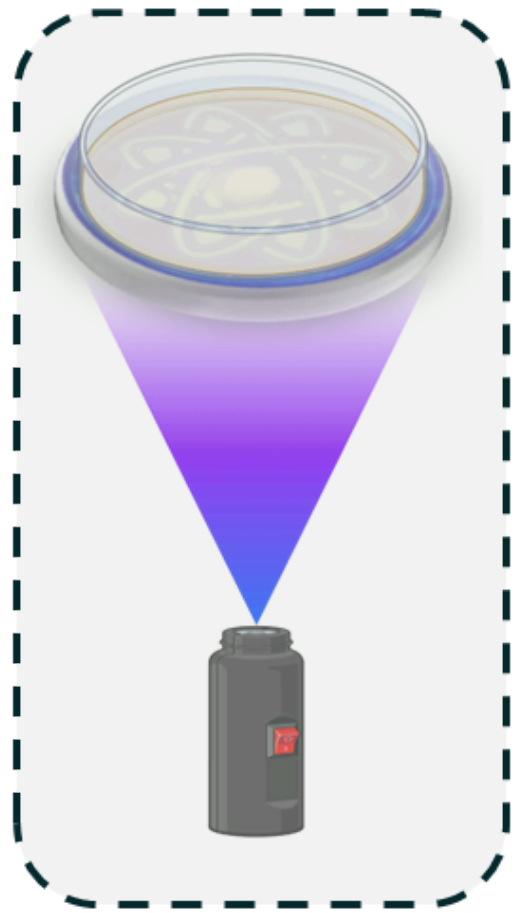
CleanCure™- X-series

mechanical properties



CleanCure™- X-series

Experiment setup



CleanCure™

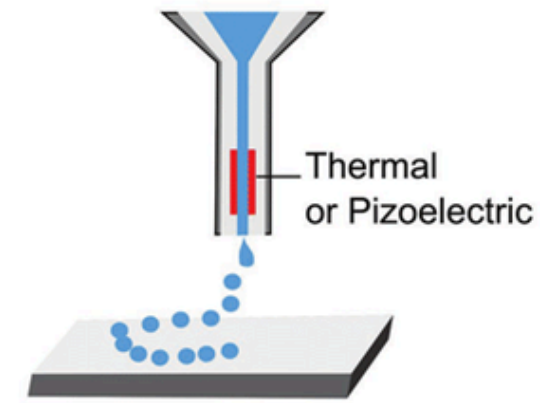


GelMA+PI

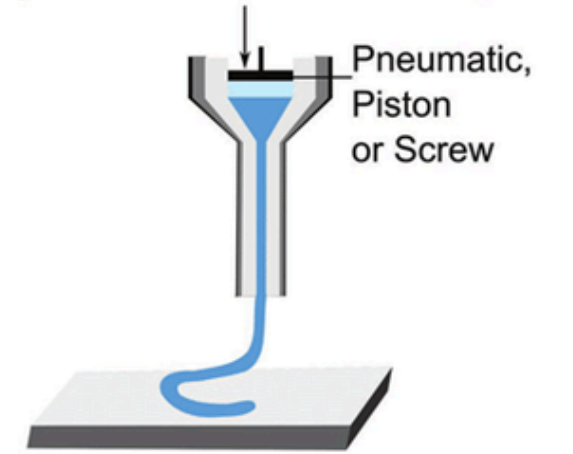


Highly compatible with a wide range of bioprinting methods

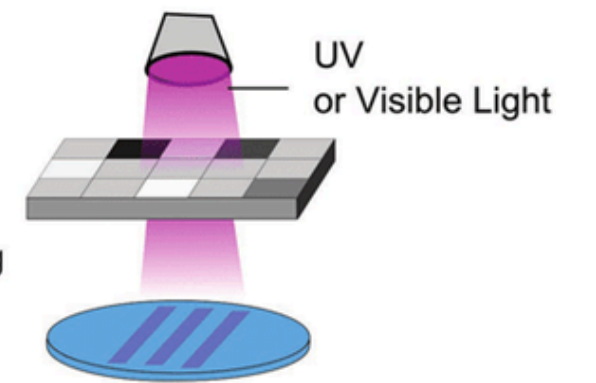
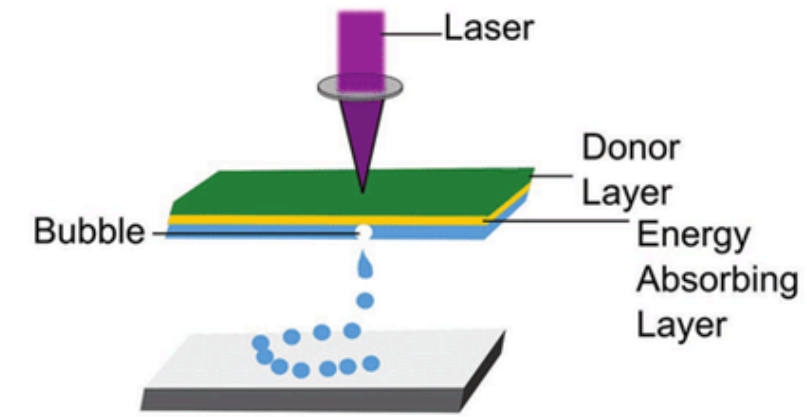
(A) Inkjet Bioprinting



(B) Microextrusion Bioprinting

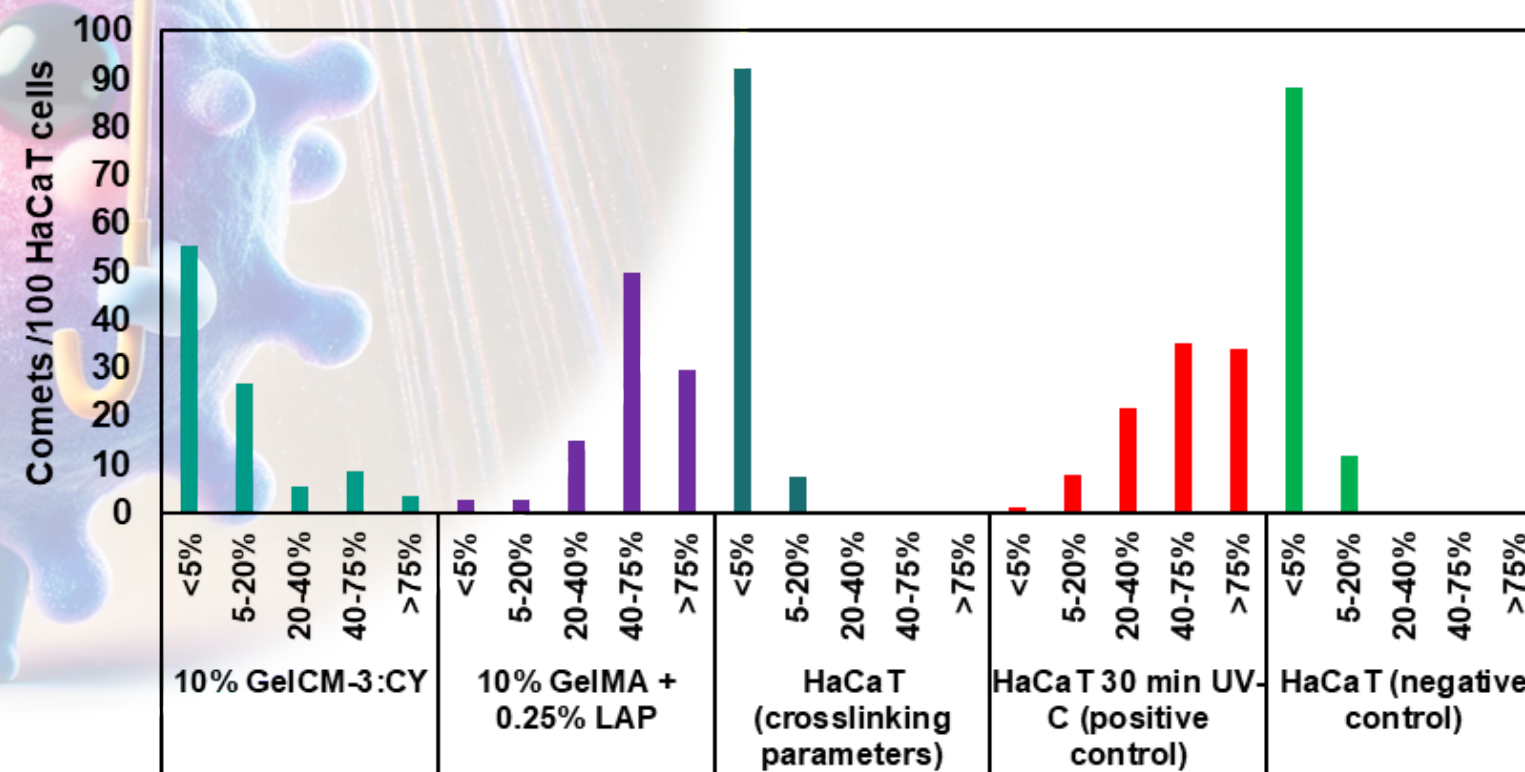
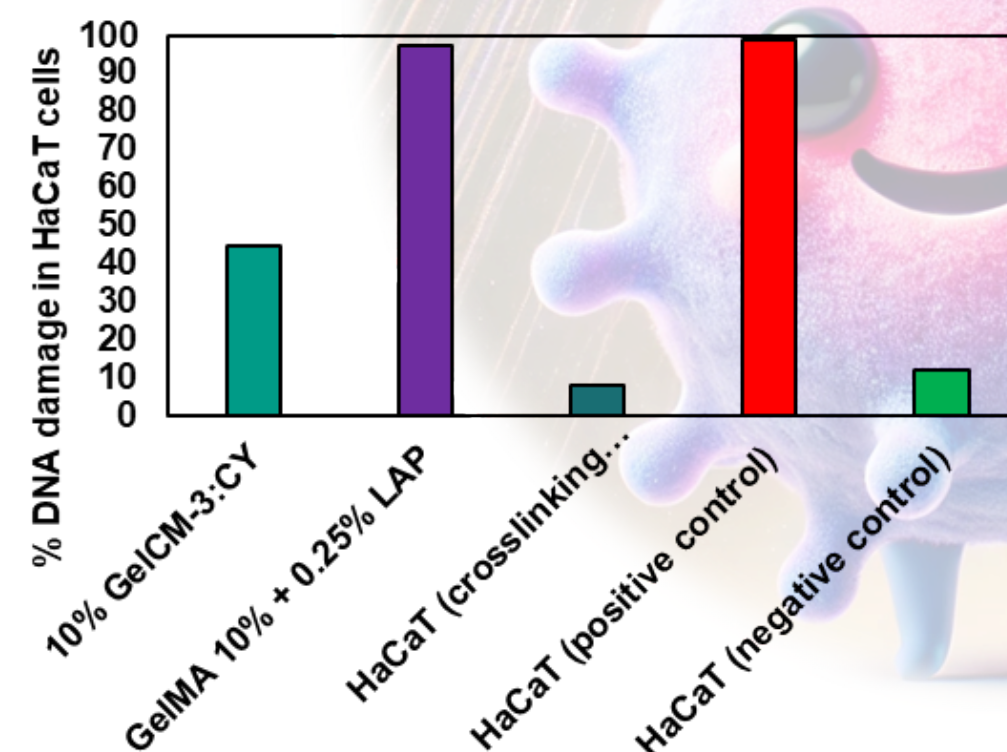
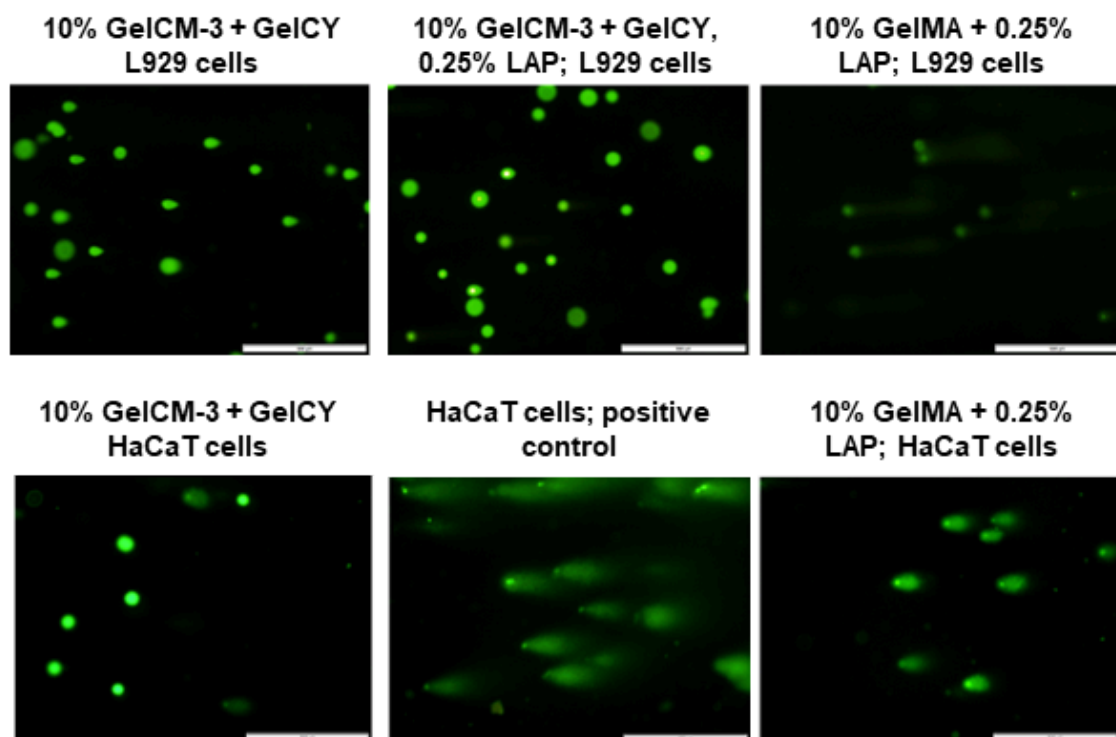
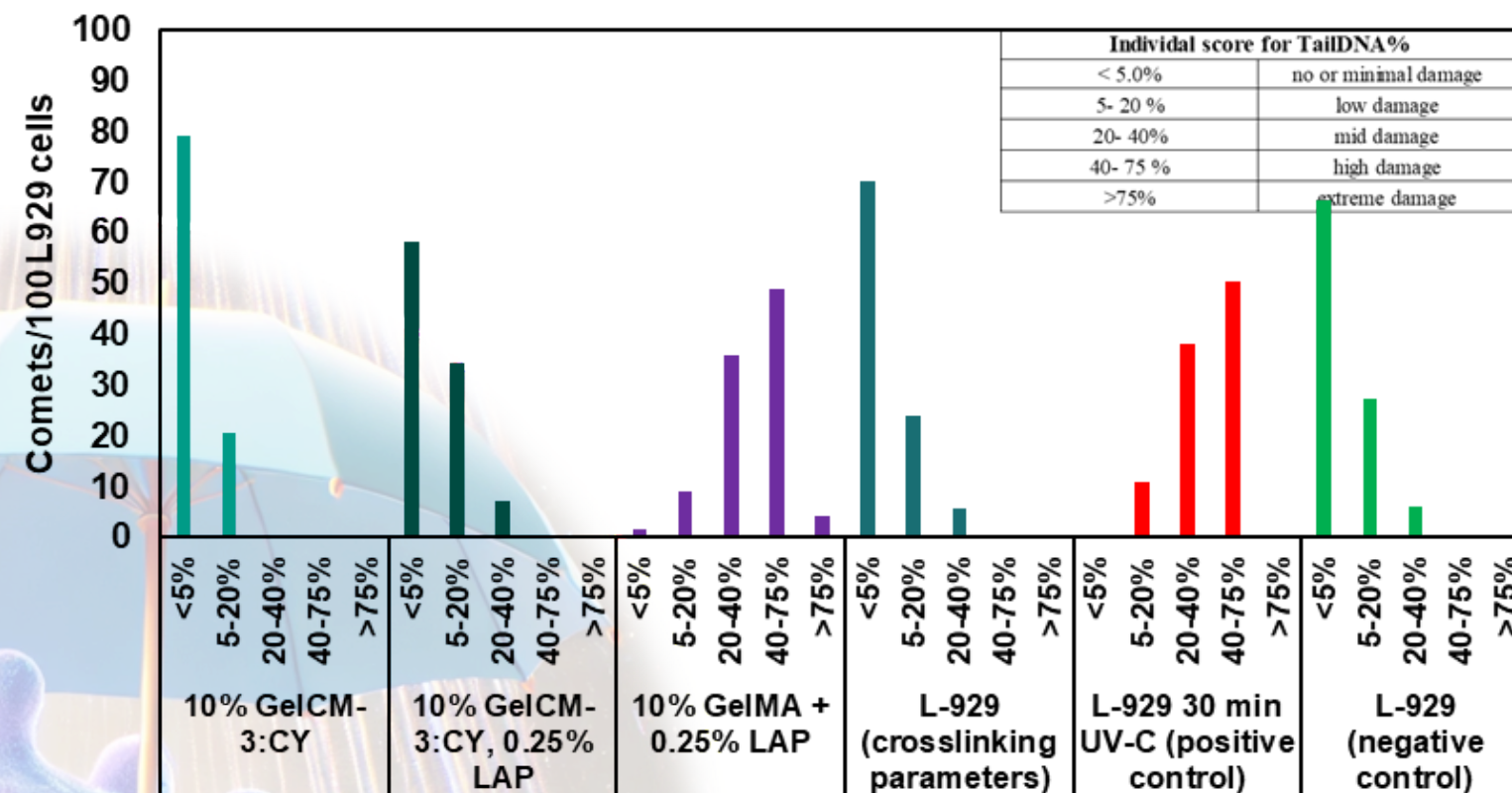
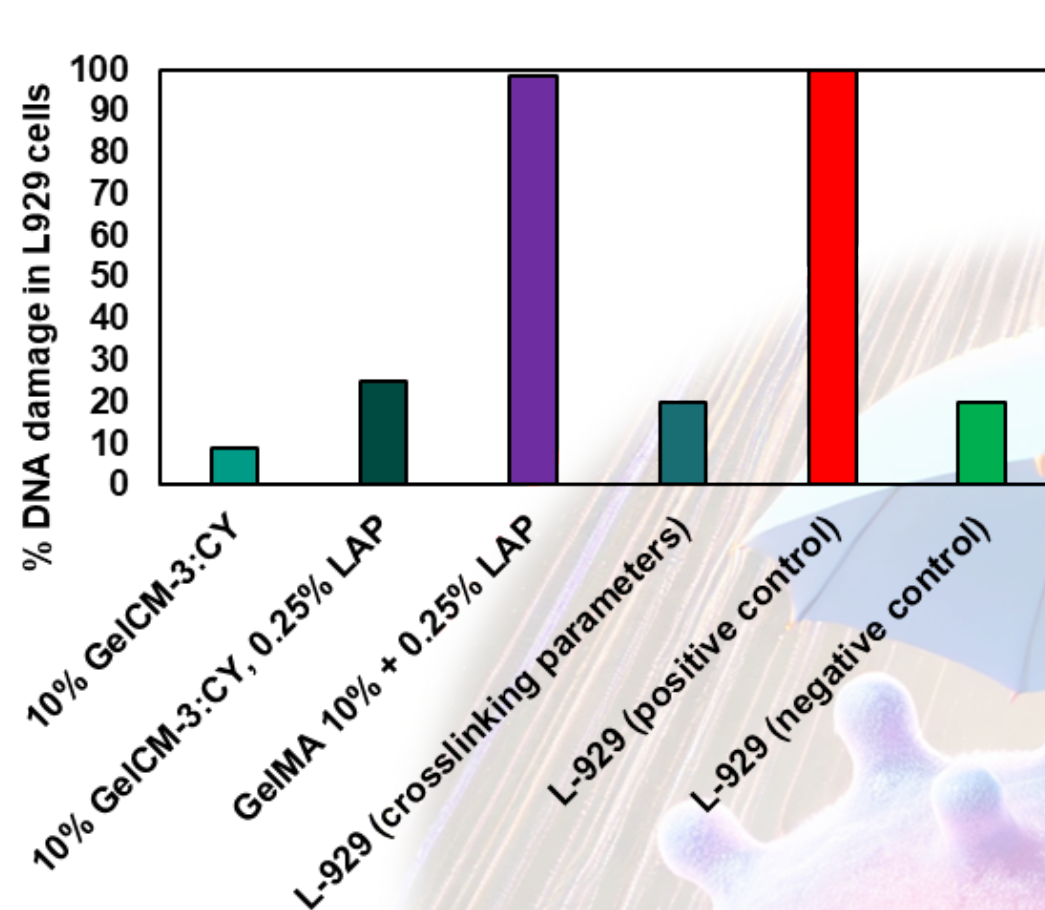
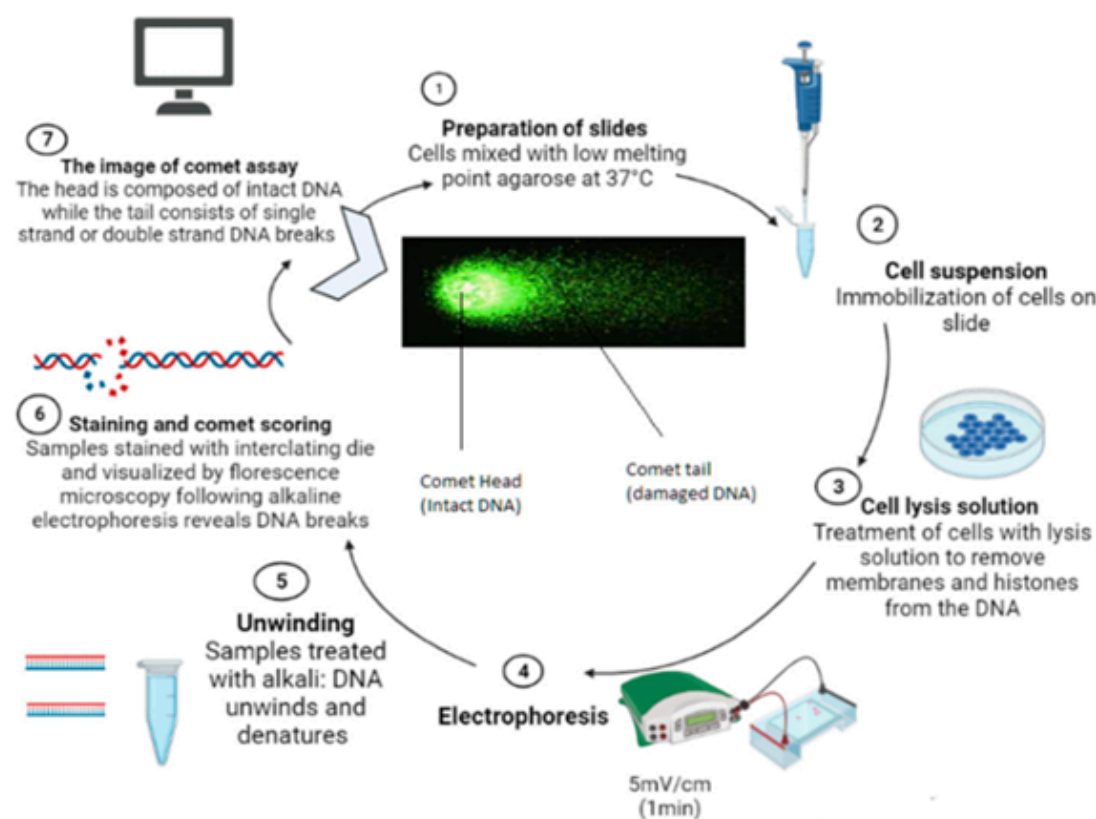


(C) Laser-assisted Bioprinting (D) Stereolithography Bioprinting

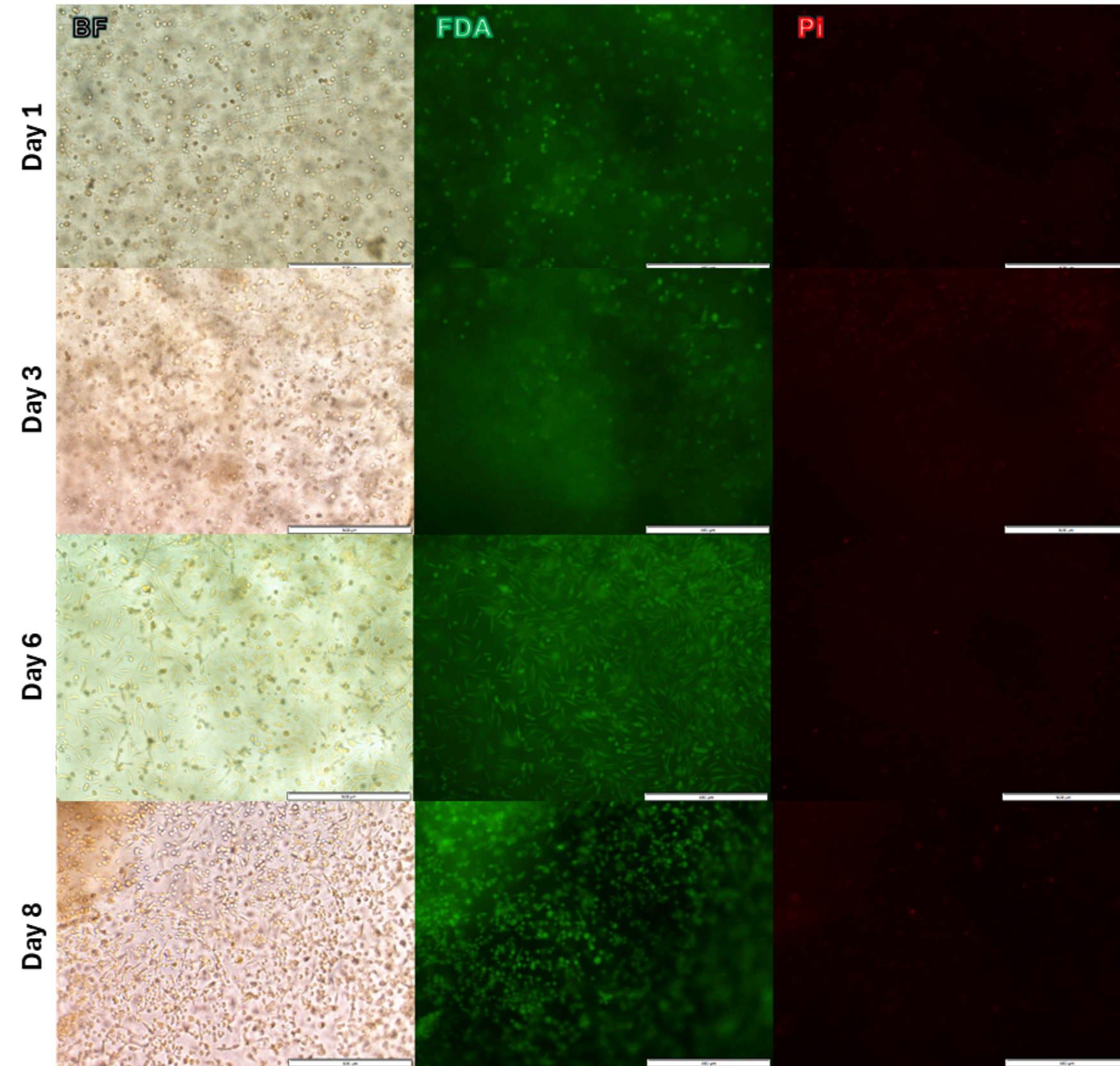
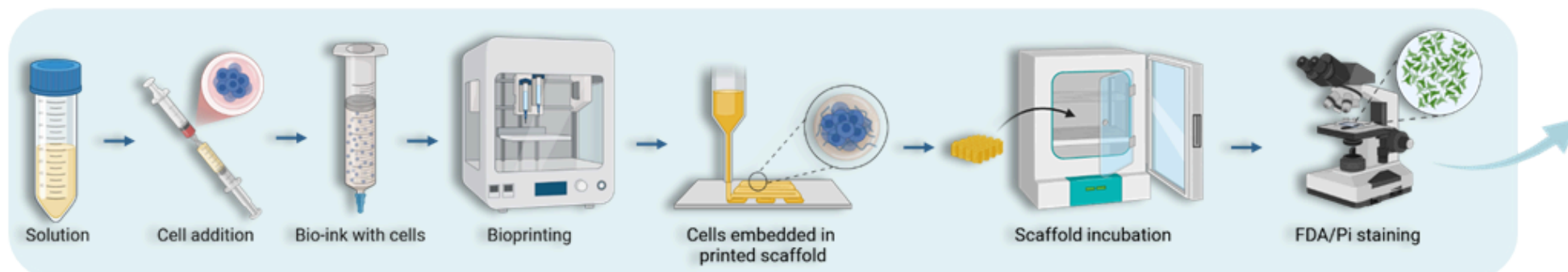
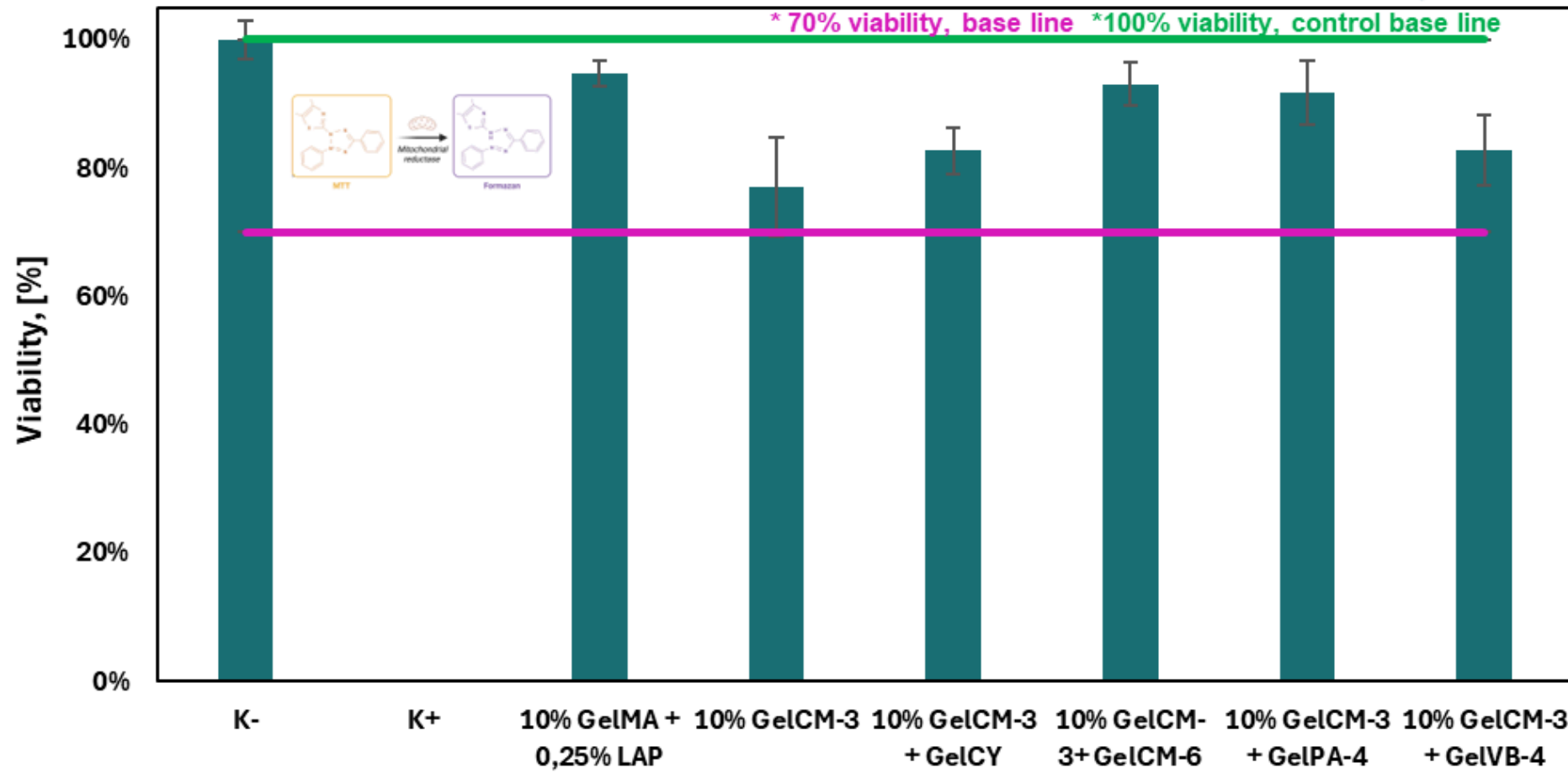
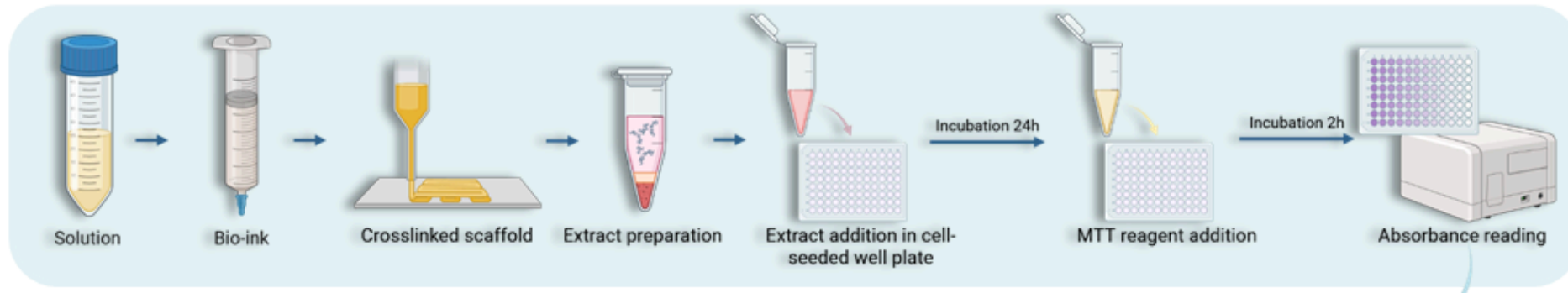


CleanCure™- X-series

Mechanism does matter!



CleanCure™- *biological properties*





POLBIONICA