

# Flame Nanomaterial and Device Engineering for Biomedicine

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Nanoscale materials show great potential in the biomedical field as they can serve as superior bioimaging contrast agents, diagnostic and therapeutic tools, while a *key* element for the successful implementation of nanoscale materials in clinical applications is multi-functionality. However, the two main bottlenecks for the successful commercialization of such nanotechnologies, that are often neglected in studies, are scalability and reproducibility. Here, I will showcase a few recent examples of how flame nanoparticle synthesis, a nanomanufacture process famous for its scalability and reproducibility, may be employed for the production of sophisticated nanoscale materials to tackle important medical problems. A specific focus will be placed on the control of the physicochemical properties and functionality of flame-made nanostructures from simple oxides to multi-component core-shell nano-architectures and how their surface properties may be tuned for increased biocompatibility and superior performance. Finally, the incorporation of such functional nanomaterials in multi-scale structures will be highlighted, for example by the direct deposition of freshly-formed flame-made nanoparticles on selected substrates towards the rapid fabrication of reliable devices such as magnetic actuators and biosensors.

## **Related references**

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