Sustainable optical biosensing with bioinspired tools and nanomaterials

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The development of optical biosensors characterized by high sustainability, superior analytical performance and possibility of smartphone interfacing represents a challenge for analytical chemists. Different biorecognition elements, including enzymes, cells, and cell-free transcription translation systems, can be implemented on sustainable and low-cost supports to obtain fit-for-purpose biosensors. The implementation of different strategies and sensing platforms for improving the performance of optical biosensors relying on bio-chemiluminescence and colorimetric detection will be discussed. In particular, the combination of bioluminescence with nanomaterials (e.g., metal-organic frameworks, gold nanoparticles) together with paper, 3D-printed microfluidic chips, and microfluidic thread-based analytical devices (μTADs), is presented.[1-4]
The implementation of artificial intelligence (AI) algorithms combined with smartphone-based detection to provide user-friendly biosensors will be also discussed.
Applications of these optical biosensors are presented together with main limitations and current challenges to turn them into marketable biosensors.

References

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