SPIC 2025 : Cinquième congrès national Sciences et Technologies des systèmes pi-conjugués
20-23 Janv. 2025, Paris 75013 (France)

Organic materials, optical resonances and strong light-matter coupling

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Joining the rich photo-physics of organic light-emitting materials with the exquisite sensitivity of optical resonances to geometry and refractive index enables a plethora of devices with unusual and exciting properties. Examples from my team include microlasers for real time sensing of cellular activity and long-term cell tracking,[1-3] as well as the development of photonic implants with extreme form factors[4-5] and wireless power supply[6] that support thousands of individually addressable organic LEDs and thus allow optogenetic targeting of neurons deep in the brain with unprecedented spatial control.

Very recently, by driving the interaction between excited states in organic materials and resonances in thin optical cavities into the strong coupling regime, we unlocked new tuning parameters which may play a crucial role in the next generation of TVs and computer displays to achieve even more saturated colour while retaining angle-independent emission characteristics.[7-8]

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