



Italian National Agency for New Technologies,
Energy and Sustainable Economic Development

Patterning of micro-LEDs/OLEDs

MicroLEDs Technology and Applications

EPIC on line Technology meeting June 5th 2020

Francesco Antolini

- Fusion and Technologies for Nuclear Safety and Security Department
- Physical Technologies for Safety and Health Division
- Photonics Micro and Nanostructures Laboratory



MILEDI project and micro-LED/OLED patterning

All Blue micro LED/OLED array

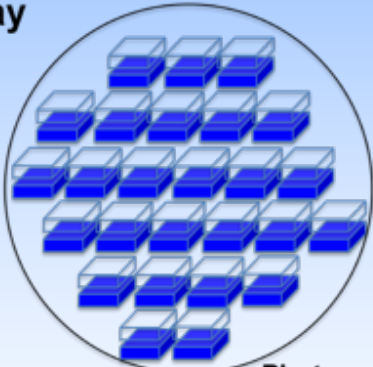
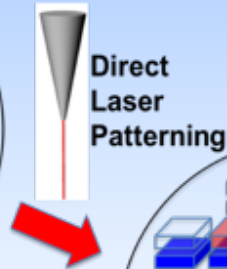
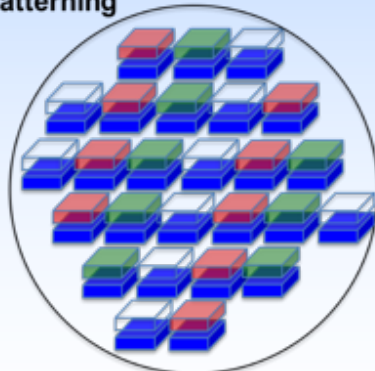


Photo-lithography



MILEDI
Micro Quantum Dot-Light Emitting Diode/Organic
Light Emitting Diode - Direct patterning



RGB mQDL/OEDs array

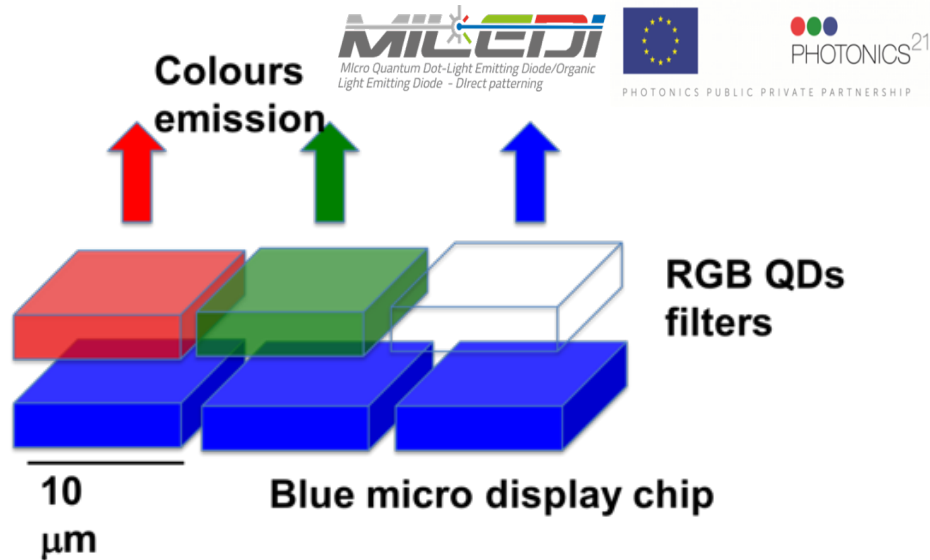


PHOTONICS²¹

PHOTONICS PUBLIC PRIVATE PARTNERSHIP

- Use of nanomaterials (QDs) as color converters to obtain an RGB micro LED/OLED
- Direct Laser Patterning for «in situ» generation of QDs. The laser parameters modulate the QDs optical properties
- Photo-lithographic patterning of high performances QDs.
- Comparison of micro-LED and micro-OLED devices

Micro-LED and micro-OLED patterning



Main parameters	Micro-LED	Micro-OLED
Brightness	high	medium
Power consumption	low	medium
RGB	difficult	medium



- Nanomaterials for high optical performances (color conversion efficiencies)
- RGB pixels by laser/photolithography for micro-LED manufacturing

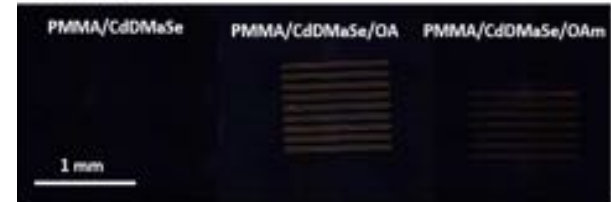
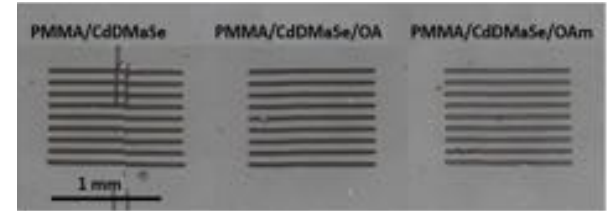
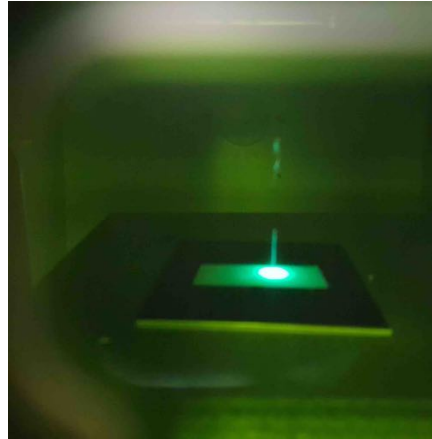
What we can do for EPIC...

Activities of Photonics and Chemical Technologies Laboratory

- Precursors synthesis
- Laser patterning (UV 355 nm, ns laser)
- Photo-physical characterisation



Precursors synthesis



Laser patterning



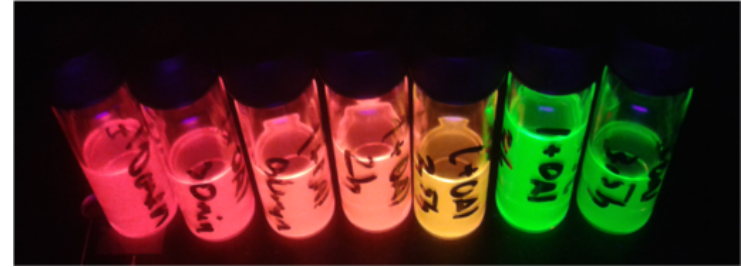
What we can do for EPIC...

Activities of Photonics and Chemical Technologies Laboratory

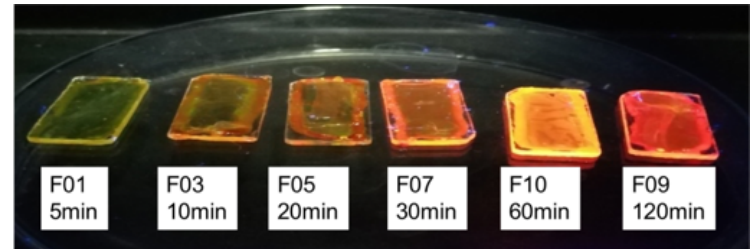
- Nanomaterials synthesis
- Photo-physical characterisations



Nanomaterials synthesis



Photoluminescent nano-structured materials in solution



Photoluminescent nano-structured materials in film

...what EPIC can do for us

Future activities and collaborations

- Collaborations within Europe with LED/OLED devices manufacturer
- Reports on future trends on photonics also from the economic point of view;



University of St Andrews



TECHNISCHE UNIVERSITÄT DRESDEN



UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA



Micro-LED/OLED island



Francesco Antolini
francesco.antolini@enea.it

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