Making the invisible visible using cyanine J-aggregate comprising upconversion devices

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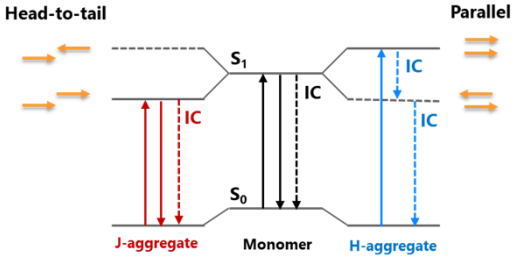
Introduction

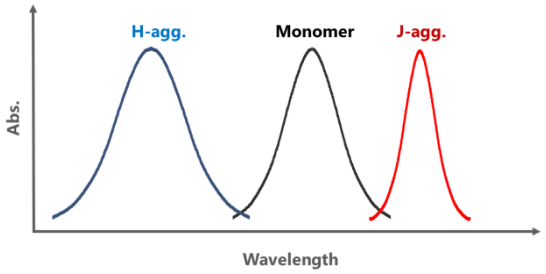
- Organic NIR upconverter (OUC) combines an organic photodetector (OPD) with an OLED
- OUCs convert NIR light directly to visible light
- J-aggregate cyanine dyes show advantage of very narrow absorption width and high absorption coefficient
- Wavelength-selective OUCs are important for machine vision systems and biological imaging

Applications

Biomedical imaging | Si-wafer inspection | Mammal monitoring

J-aggregates

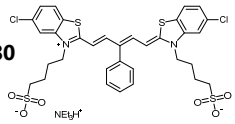




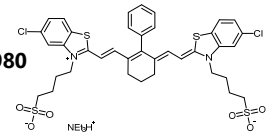
Results

Materials

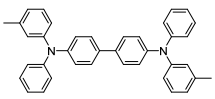
Pentamethine J 780



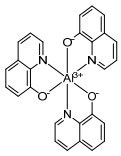
Heptamethine J 980



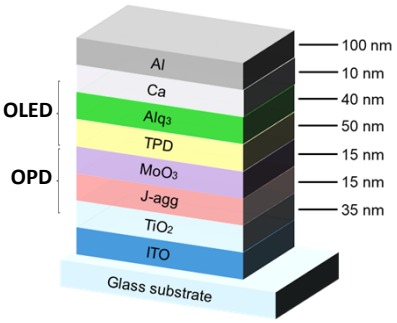
TPD



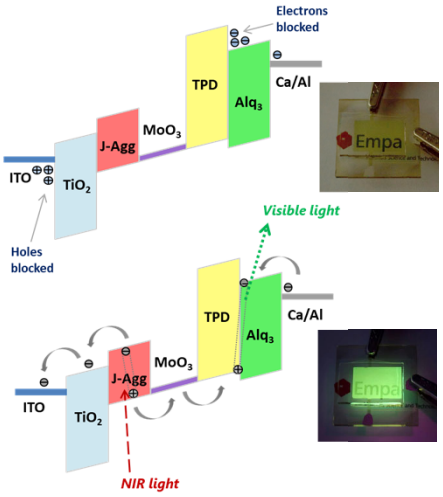
Alq_3



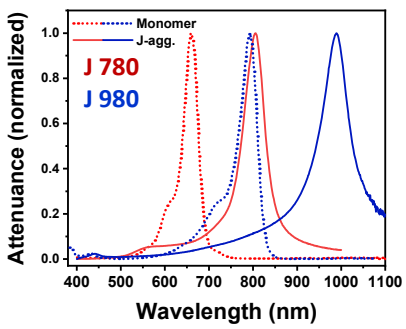
Device structure



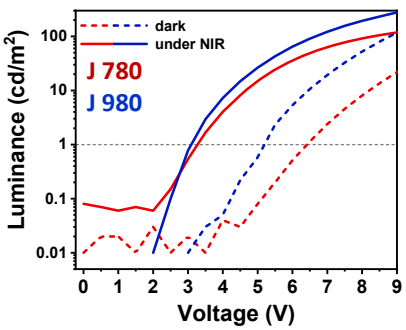
Operation mechanism

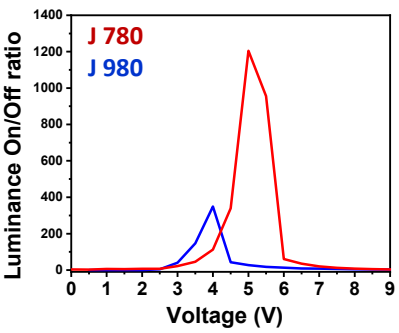


Absorption



Upconverter performance





Conclusions

- J-aggregate cyanines were successfully integrated in an OUC
- Selective absorption in the NIR at 780 nm and 980 nm
- Narrow absorption width of ~50 nm
- OUCs show a low turn-on voltage of 3-3.2 V and a high on/off ratio up to 1200.

Acknowledgement

- This work was supported by the Brazilian-Swiss Joint Research Programm (BSJRP)

- Pictures: www.ipbio.org.br/; www.medscape.com www.astrainc.co.jp/sui_wafer_inspection.jpg;

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