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Jena, 20. Juni 2019

EINLADUNG

Am Freitag, **12. Juli 2019**, spricht um **12:15 Uhr**
in der Spacebox, 1. OG des ZAF, Philosophenweg 7,
07743 Jena

Frau Assoc. Prof. Emine Tekin

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zum Thema

“ Ink Formulations and Their Applications ”

gez. Prof. Dr. Ulrich Schubert

Alle Interessenten sind herzlich eingeladen.

Es handelt sich um eine Veranstaltung des Center for Energy and Environmental Chemistry Jena (CEEC Jena) der FSU Jena.

Ink Formulations and Their Applications

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In this contribution, recent progress in the understanding of inkjet printing process will be presented. Many of the applications in new generation/flexible electronics require inexpensive, often single-use devices that are ideally suited to inkjet printing. Organic light-emitting diode (OLED) is a new technology has been developed as an alternative to inorganic devices. In addition to being cheap and easily processed; organic materials's molecular design and functionality can be formatted according to purpose. The most important benefits of this new technology is being light, thin and the most importantly they can be manufactured much more cheaply. The most outstanding feature of PLED's compared to inorganic LEDs is flexibility. So they can be easily applied on different flexible layers except on glass and they can provide various geometric designs. Light-emitting polymer layer can be processed as thin film directly from its solution. Spin-coating is one of the most commonly used methods in scientific studies. However, this method has many disadvantages; large amount of solution needs to be wasted, polymers of different colors cannot be applied to the same surface and the method is not suitable for coating of large areas. For these reasons, inkjet printer is more preferred for industrial applications. Differences in thin film preparation techniques create differences in the thin film features thus the performances of the devices are affected significantly. One of the main problem that the research and development laboratories who tries to produce and develop commercial PLED display technology face with is the deficient performance of inkjet printed devices compared to spin coated ones. While this problem is an important subject of research, very few researchers direct towards this subject and many questions are waiting for their answers. Some of these questions are as follows: what is the difference between morphology of polymer films obtained from ink-jet printing and spin coating? Which physical parameters create these differences and what is the effect of these parameters on the device performances? What are the effects of the low vapor pressure solvents used for printer? Therefore the most important goal of this contribution to elucidate the physical features effecting to the PLED's working efficiency. Finally, ink formulations for biological applications will be presented.



Assoc. Prof. Emine Tekin, chief senior researcher, graduated from Istanbul Technical University, Department of Chemistry in 1998. She received her MSc (2001) degree from Istanbul Technical University Department of Chemistry and her Ph.D. degree from Eindhoven University of Technology (the Netherlands) Laboratory of Polymer Chemistry and Nano-science (2007). She worked as a scientist in Cambridge Display Technology (2007-2009, UK). She has 31 scientific publications and 6 patents. Her research fields involve organic and hybrid electronics like OLEDs, OPVs; perovskite photovoltaics; inkjet printing thin films; nanoparticles. She has been working in TUBITAK since 2010.

Selected Projects:

- 320 x 240 Pixel RGB AMOLED Avionics Display Development (2016-2019, TUBITAK-ASELSAN Cooperation)
- Development of New Designed Transparent Conductive Electrodes for Organic Electronics (2017-2019, Slovakia Academy of Sciences (SAS) and TUBITAK Bilateral Cooperation)
- Development of OLED Based Vehicle Exterior Lighting Rear Position Lamp Prototype (2014-2016, FARBA, Gebze Technical Uni. and TUBITAK Cooperation)

Selected Papers

- R. Kaçar, S. P. Mucur, F. Yıldız, S. Dabak and **E. Tekin***, Solution processed ternary blend nano-composite charge regulation layer to enhance inverted OLED performances, *Applied Physics Letters*, 2018, 112,16,163302
- R. Kaçar, S. P. Mucur, F. Yıldız, S. Dabak and **E. Tekin***, Highly efficient inverted organic light emitting diodes by inserting a zinc oxide/polyethyleneimine (ZnO:PEI) nano-composite interfacial layer, *Nanotechnology* 2017, 28, 245204
- I. Osken, A.S.Gundogan, E. Tekin, M. S. Eroglu, T. Ozturk Fluorene–Dithienothiophene-S,S-dioxide Copolymers. Fine-Tuning for OLED Applications, *Macromolecules* 2013, 46, 9202.
- S. Odabas, E. Tekin, F. Turksoy, C. Tanyeli Inexpensive and valuable: a series of new luminogenic molecules with the tetraphenylethene core having excellent aggregation induced emission properties. *Journal of Materials Chemistry C*, 2013,1, 7081.
- E. Tekin, P. J. Smith and U. S. Schubert Inkjet Printing of Functional Materials: From Polymers to Nanoparticles and Molecules *Soft Mater*, 2008, 4, 703
- **E. Tekin**, P. J. Smith, S. Hoepfner, A. M. J. van den Berg, A. S. Susa, A. L. Rogach, J. Feldmann, U. S. Schubert, Inkjet printing of luminescent CdTe nanocrystal/polymer composites, *Adv. Funct. Mater.* 2007, 17, 23

Selected Patents:

- Thienothiophene and dithienothiophene – boron (donor-acceptor) based materials for organic light emitting diodes, **WO 2016132180 A1**, Patent Holder: TUBITAK (T. Ozturk, A. Buyruk, G. Turkoglu, E. Tekin, S. Piravadili, M. E. Cinar, A. C. Goren)
- Thienothiophene / dithienothiophene -triphenylamine /tetraphenylethylene derivatives for organic light emitting diodes, **WO 2016 132179 A1**, Patent Holder: TUBITAK (T. Ozturk, A. Buyruk, E. Tekin, S. P. Mucur, A. C. Goren)
- Poly(thienothiophenylborane)s and poly(dithienothiophenylborane)s for white light emitting diodes, **WO 2015033187-A1**, Patent Holder: TUBITAK (T. Ozturk, E. Tekin, O. Sahin, E. B. Sevinis, C. Sahin, M. S. Eroglu, A. C. Goren, M. E. Cinar, G. Turkoglu)
- Interlayer formulation for flat films, **WO 2010079331 A1**, Patent Holder: Cambridge Display Technology Limited , (S. Goddard, P. Wallace, E. Tekin)