

Intelligent Display & Sensor Lab

Dept. of Electrical and Computer Engineering, Seoul National University



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➤ Members

Principal investigator

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■ 학력 (Education)

'17 | University of Michigan EECS Ph.D.
'13 | University of Michigan EE M.S.
'11 | 서울대학교 전기공학부 학사

■ 경력 (Career)

'17 ~ '19 | Apple Inc. 디스플레이 모듈 엔지니어

M.S. / Ph.D. students

고동현 (Donghyun Ko)



Research interest
Phosphorescent OLED
lifetime, exciton
dynamics

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서울대학교 전기정보공학부
졸업

양광모 (Kwangmo Yang)



Research interest
Optical simulation &
analysis of OLED,
TADF OLED

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경희대학교 정보디스플레이학과
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오산결 (Sankyeol Oh)



Research interest
Fluorescent OLED
efficiency, Micro-
display

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서울시립대학교 전자전기컴퓨터공학부
졸업

➤ Research goal - intelligent display



Interactive display (Oblivion, 2013)



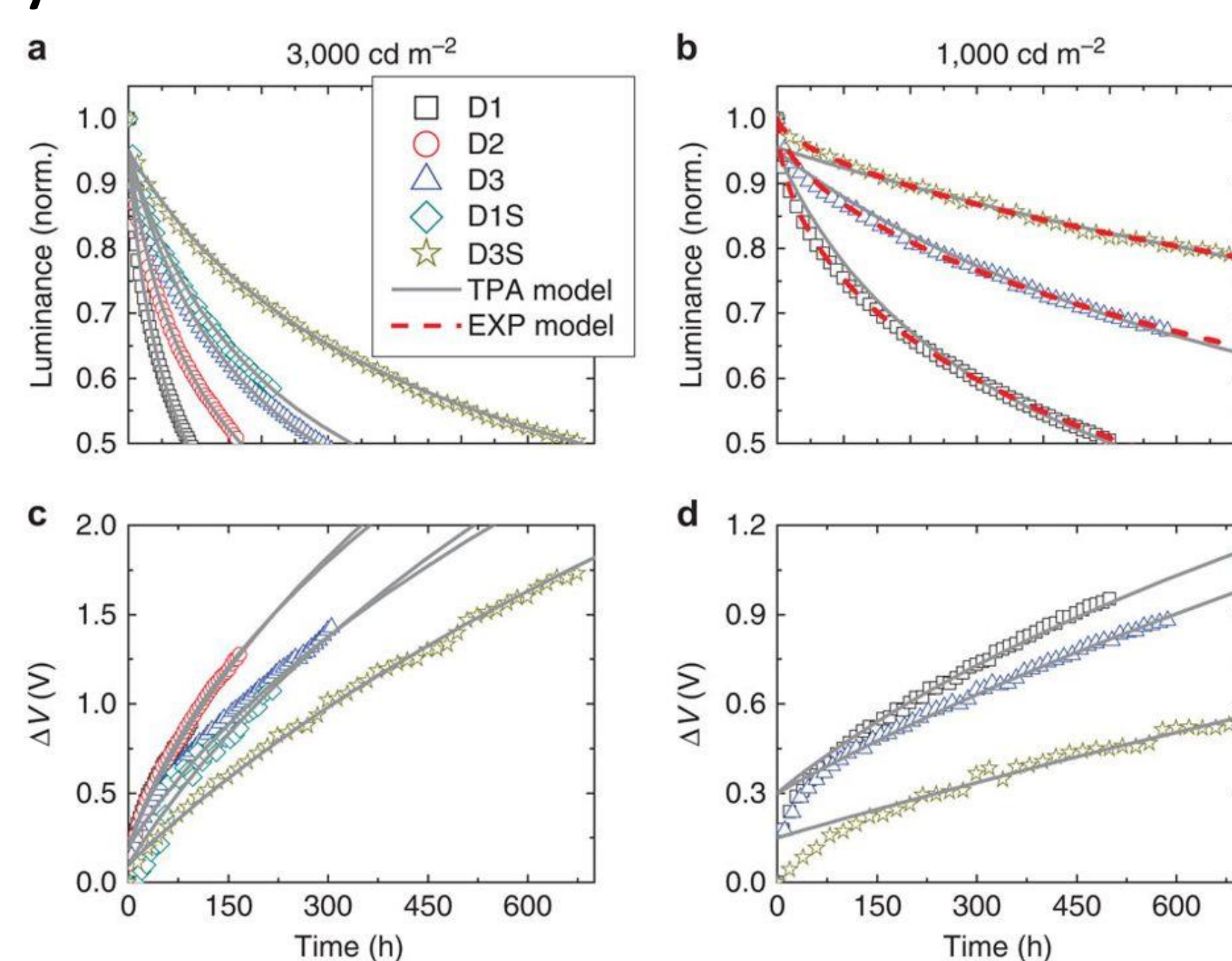
Virtual reality (VR)

■ Prerequisites for intelligent display

- High pixel resolution
- Color reproducibility and high brightness
- Flexible form factor and compatibility with sensors

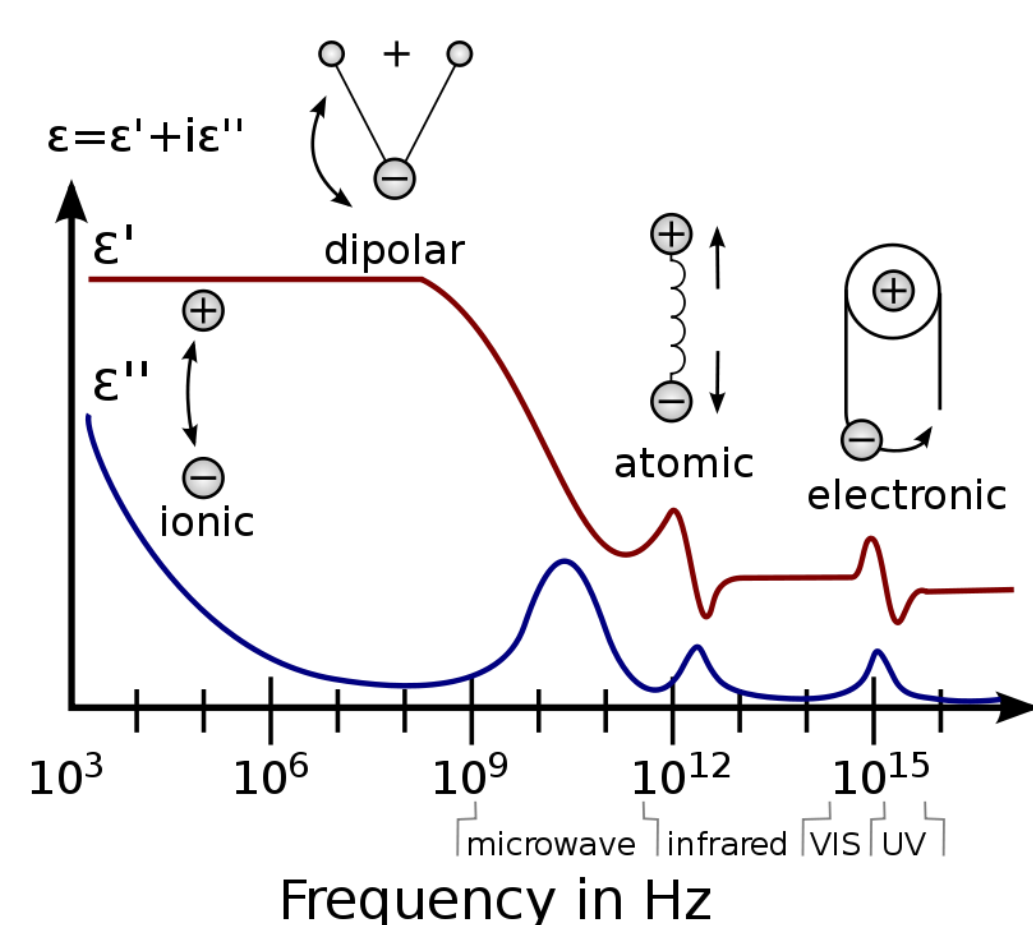
➤ Current research of our lab

■ Studying degradation mechanism and improving stability of OLEDs

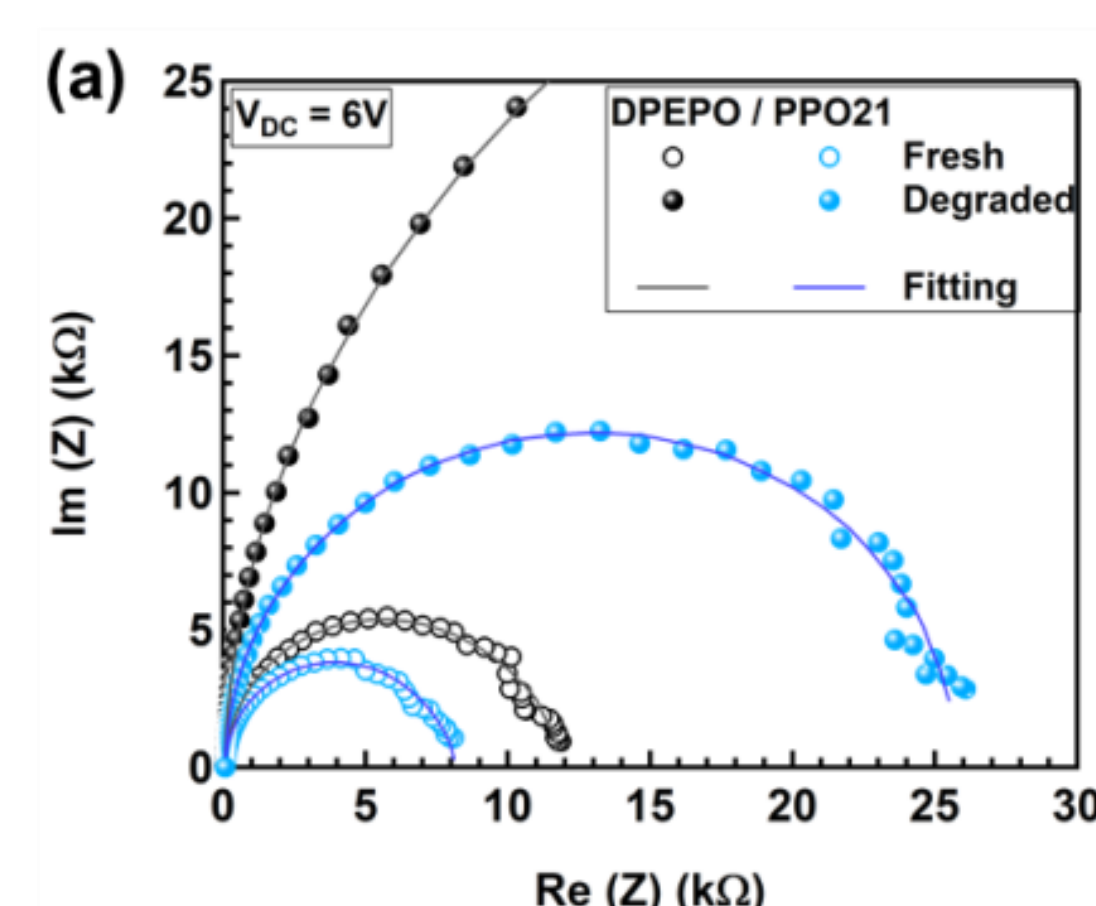


Yifan Zhang *et al.*, *Nature Communications*, **5**, 5008 (2014)

■ Impedance & capacitance analysis of organic semiconductor device



Dielectric permittivity spectrum
(wikipedia)



Jiho Sohn *et al.*, *Organic Electronics*, **70**, 286 (2019)

➤ Suitable LED for intelligent display

Organic Light-Emitting Diode (OLED)

■ Pros

- Flexible form factor
- Wide viewing angle
- High contrast ratio
- Fast response time

■ Cons

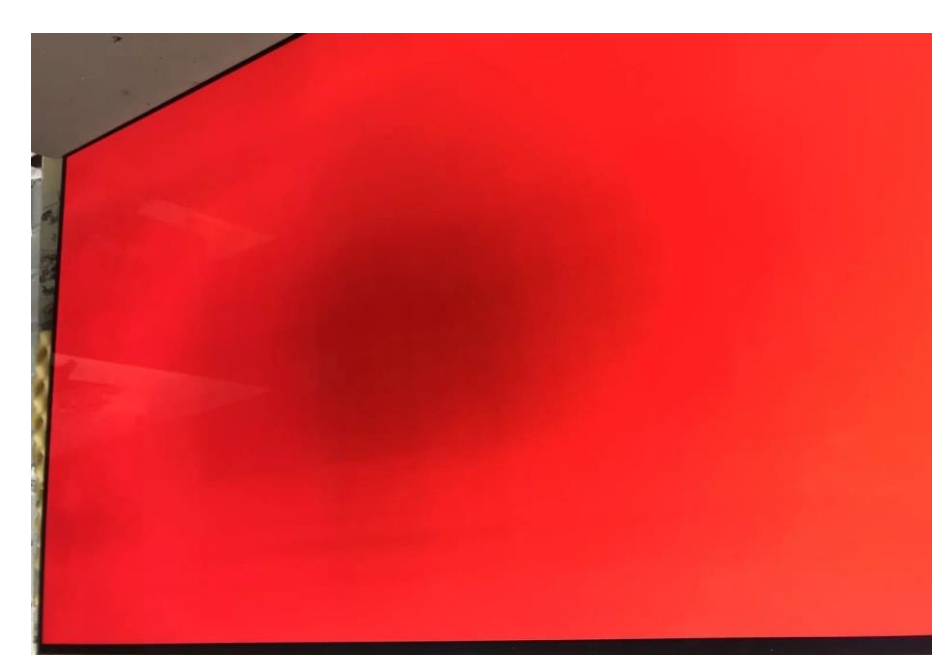
- Short lifetime of **blue** OLED
- Large susceptibility at oxygen and water
- Lack of established physical theory



18 inch flexible OLED (LG display)

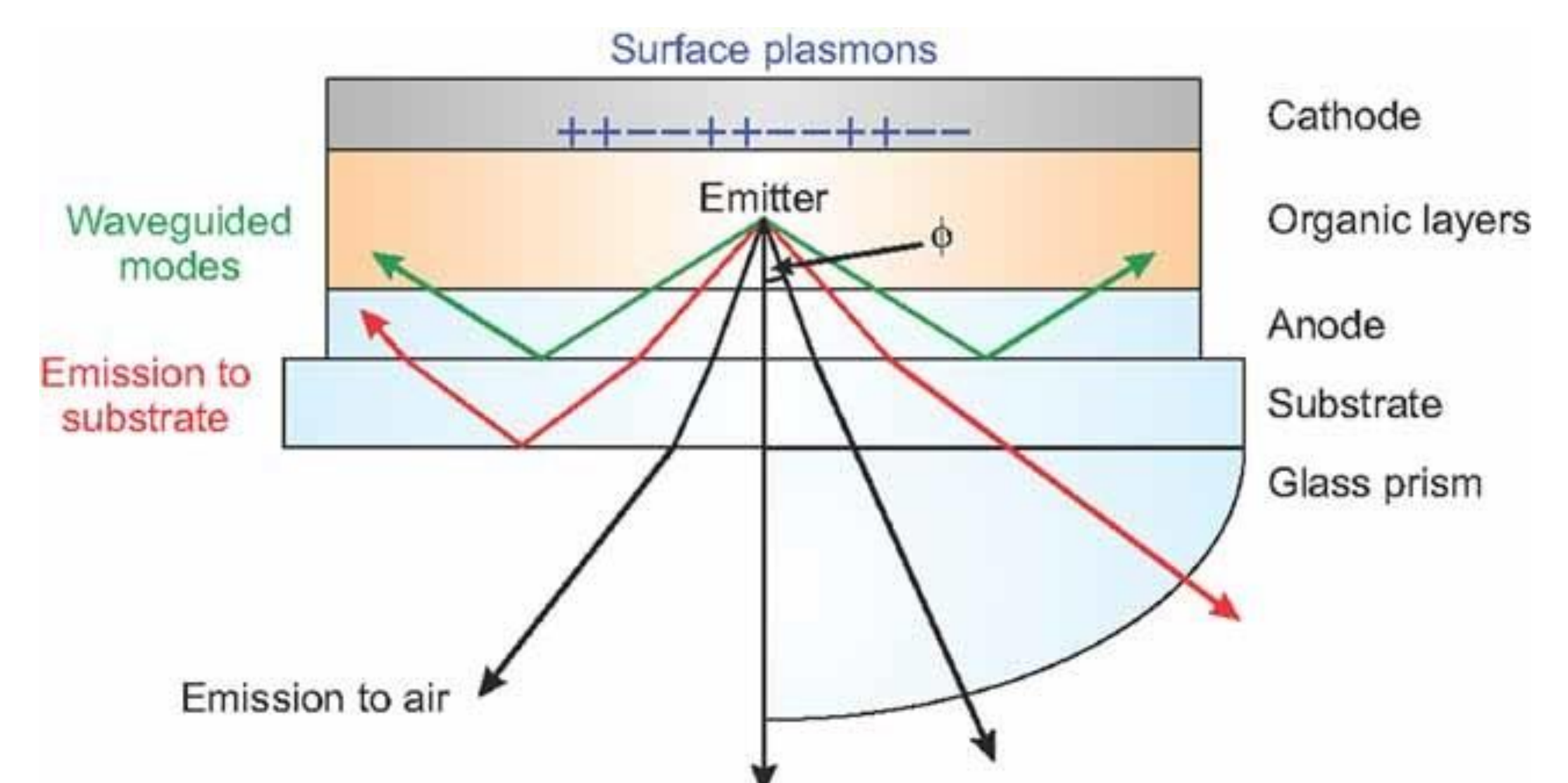


High contrast ratio (Samsung display)



Burn-in issue

■ Optical modeling, simulation and analysis of OLED



Wolfgang Brütting *et al.*, *Phys. Status Solidi A*, **210**, 44 (2013)

■ Analysis on OLED characteristics at high temperature for automotive display & VR



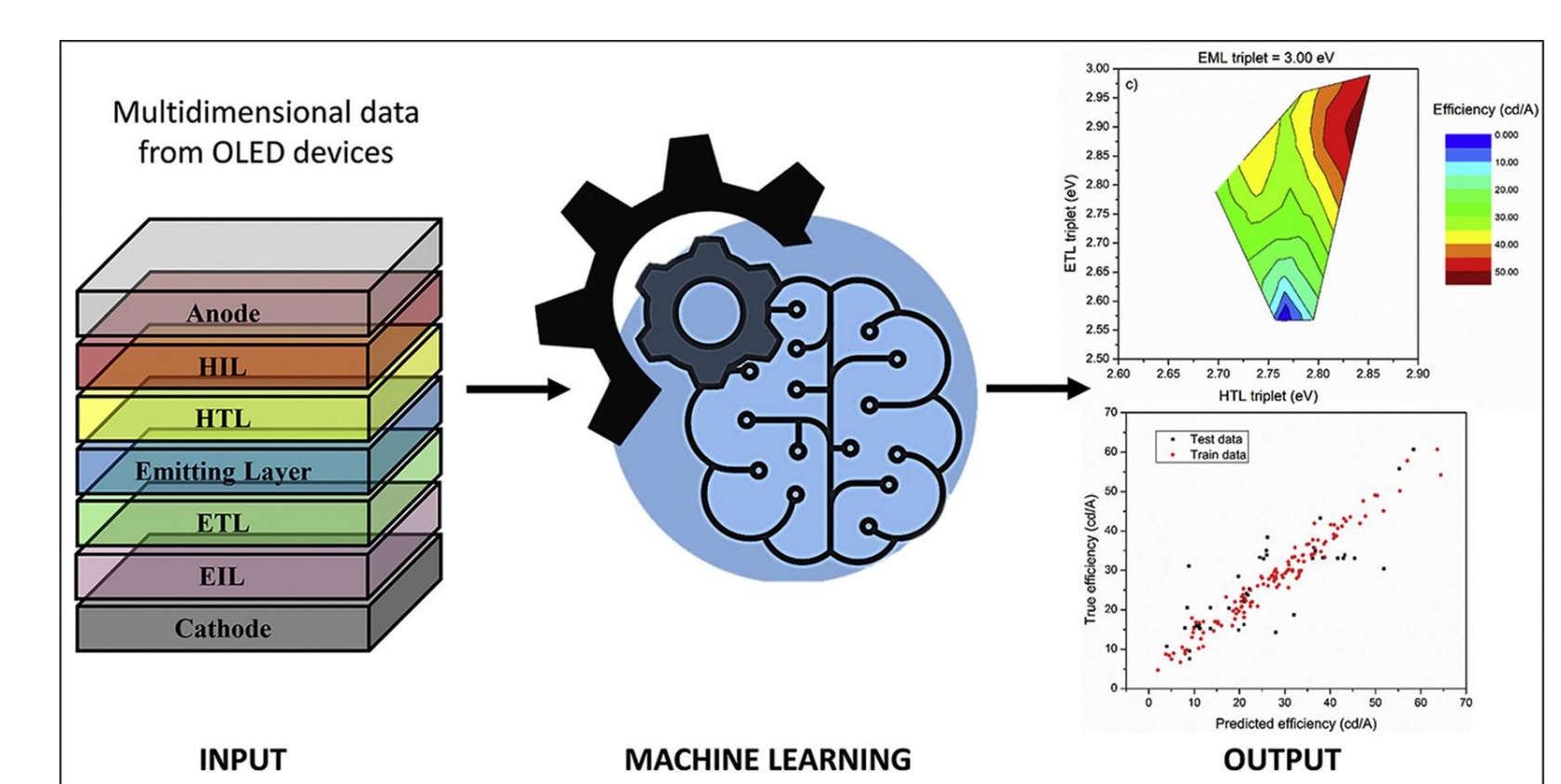
Automotive display (LG display, CES 2018)



PlayStation VR

➤ IDSL welcomes students who are interested in

- Designing intelligent display and sensor technologies
- Studying fundamental physics of organic semiconductor devices
- Applying **machine learning** to develop optoelectronic devices and materials



Muhammad Asyraf Bin Janai *et al.*, *Organic Electronics*, **63**, 257 (2018)