

Toray Research Center (TRC) and OPERA Solutions Inc. have built a partnership to offer a wide range of solutions to meet customers' demands. We jointly help customers solve their issues and support their R&D works by utilizing our expertise in the field of OLED materials, device physics, manufacturing equipment and instrumental analysis.

The art of prototyping  
OPERA Solutions



## We meet your demands

- ✓ Verification of the performance of your materials in OLED use  
⇒ **We fabricate OLED samples with your product, evaluate the performance, compare it with a reference and give you back the credible data.**
- ✓ Ex-ante evaluation of the stability of your OLED materials assuming a use in mass-production VTE  
⇒ **We perform quasi-mass-production VTE runs of your material, mimicking the condition of a linear source.**
- ✓ Replacement of components in your VTE system  
⇒ **We perform customized experiments to analyze and identify the out-gases and impurities.**
- ✓ Seeking for next generation display technologies  
⇒ **We undertake the prototyping and the proof-of-concept all at once.**

Our specialized skills enable you to do resource-efficient research works and product development

## Please contact us !



## The role of Toray Research Center

### Contributing to customer's R&D in organic electronic devices and materials by advanced analytical techniques

- ✓ Over 40 years experiences on physical & chemical analysis
- ✓ **More than 5k** performances of device reverse engineering
- ✓ Combination of various analyses to identify components and thickness of organic layers
- ✓ Validation of thin-film encapsulation with proprietary pretreatment skills
- ✓ Instrumental analysis and evaluation of organic electronic devices and materials



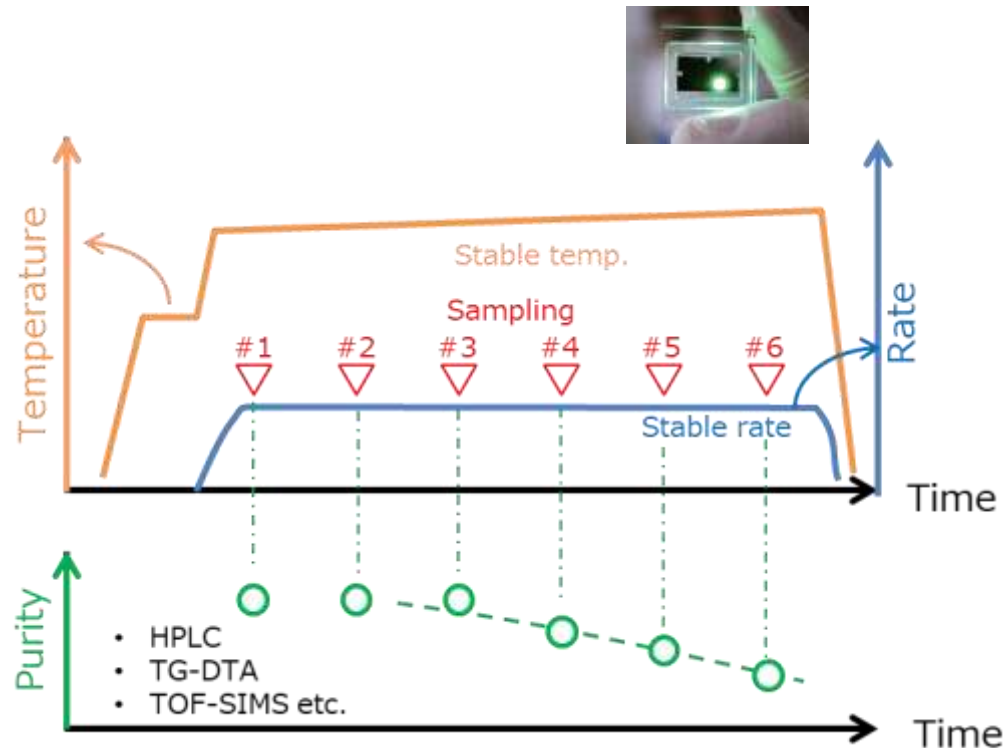
### Performing analytical services for diverse materials and business fields

- |                |                             |                           |
|----------------|-----------------------------|---------------------------|
| ● Automobile   | ● Green tech                | ● Life Science            |
| ● Batteries    | ● Materials                 | ● Bio/medical engineering |
| ● IT Equipment | ● Semiconductor & Packaging |                           |



# Example of methodology to identify issues

Long-term persistent VTE runs under a high vapor pressure, mimicking linear source condition



- ① VTE deposition with a constant rate
- ② Time series sampling
  - Purity of crucible residues
  - Characterization of deposited films
  - Comparison of OLED lifetimes



**Identification of long-term degradation phenomena and proposal for mitigation**

**We identify the issues on your material and propose how to solve them**