

Over ripeness of packaged fruits:
Difficult to assess in a non-destructive way
Consumers get affected and causes health hazards

Good health and well being

Urea acts as a source of nitrogen to promote growth of plants

However, excess urea when surface applied has health hazards and toxic to plants

Problems we want to address

Develop a cheap and non-destructive way to assess the food quality of the packaged food

Rapid and qualitative assessment of the NH_3 content of the soil

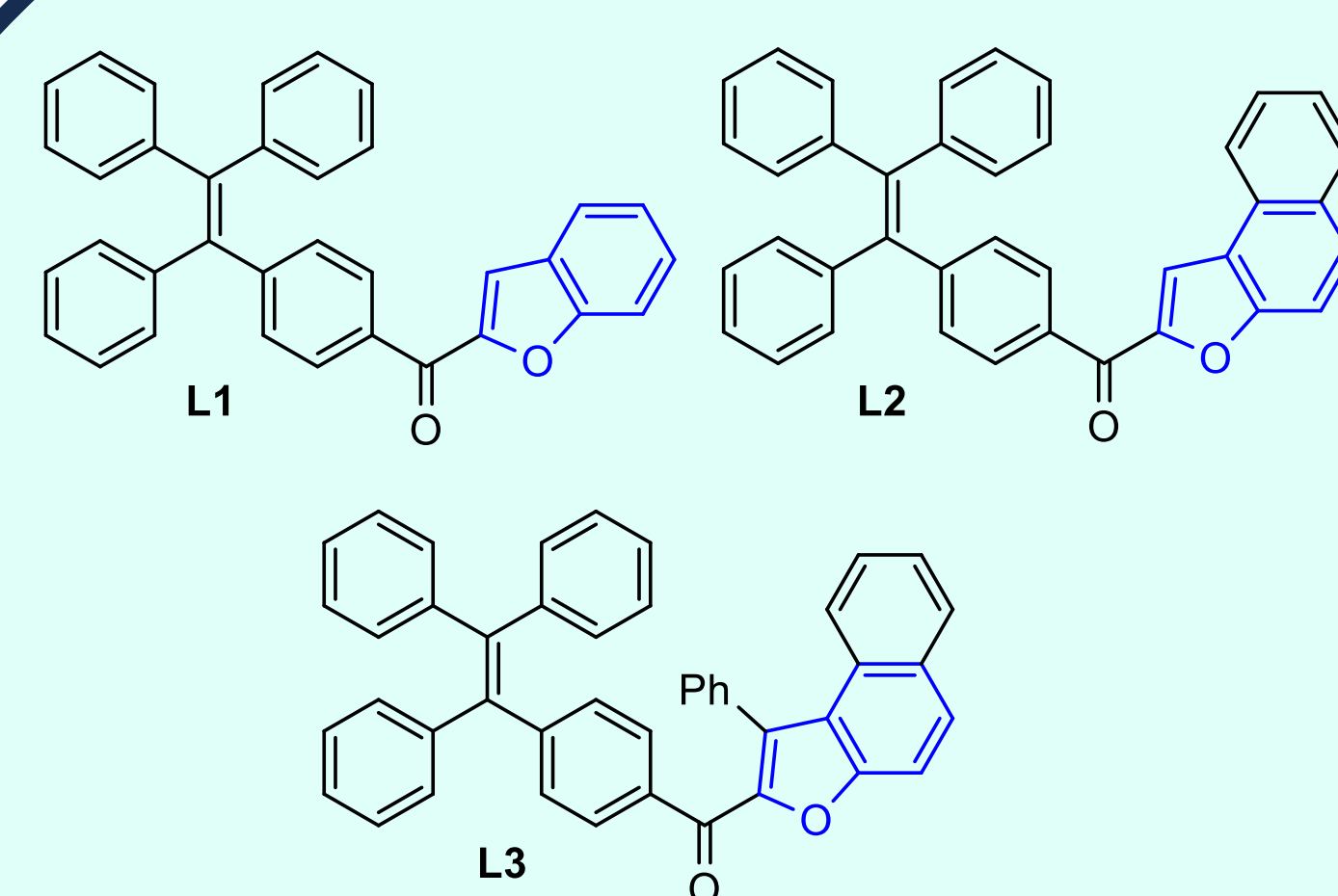
Aggregation Induced Emission

Solid-state emission is achievable by limiting the intermolecular π -stacking as well as by restricting molecular motions by precisely controlling the supramolecular interactions

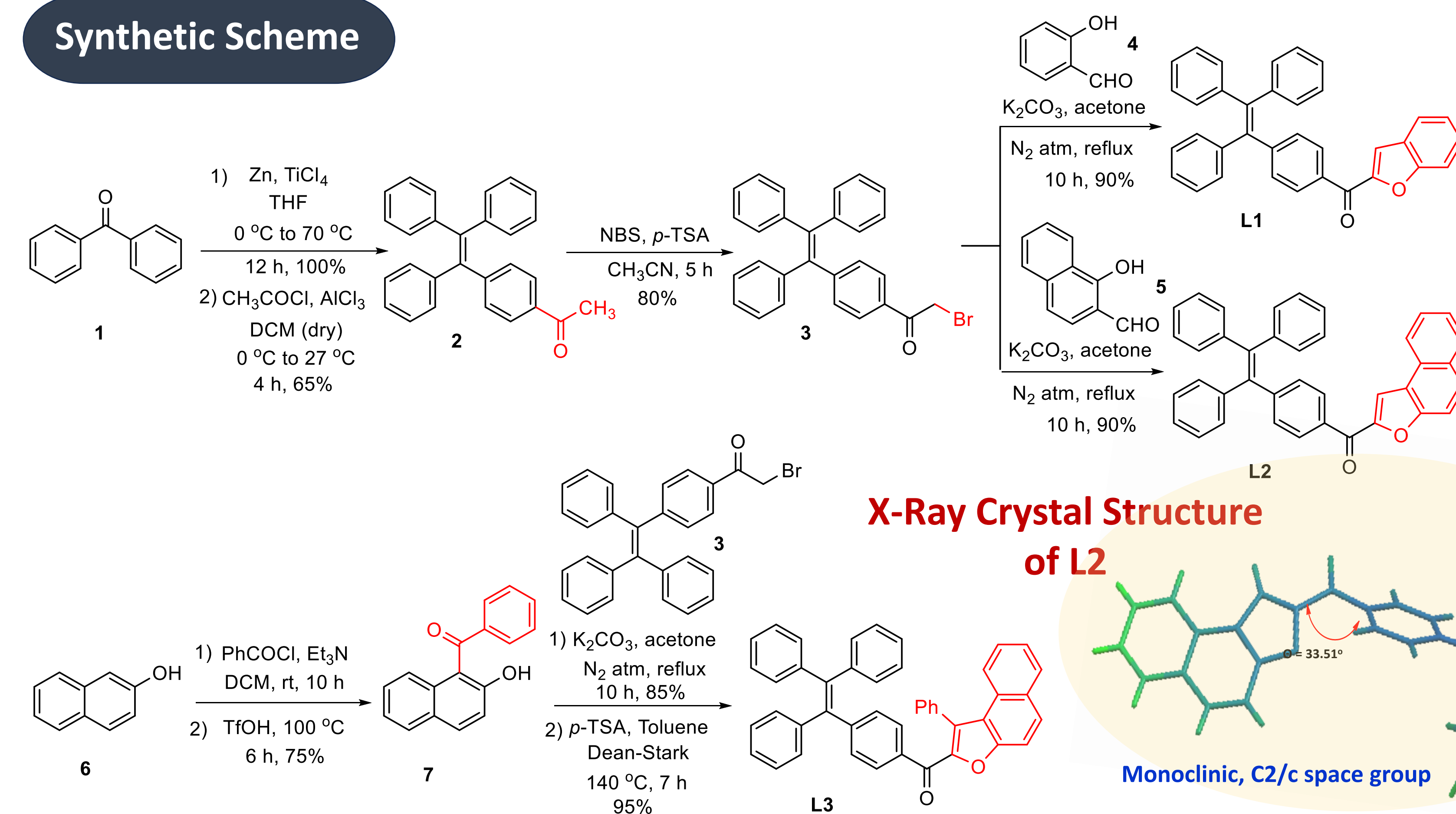
Our Approach

Design and synthesize solid-state emissive luminogens and develop paper strip based probes for monitoring

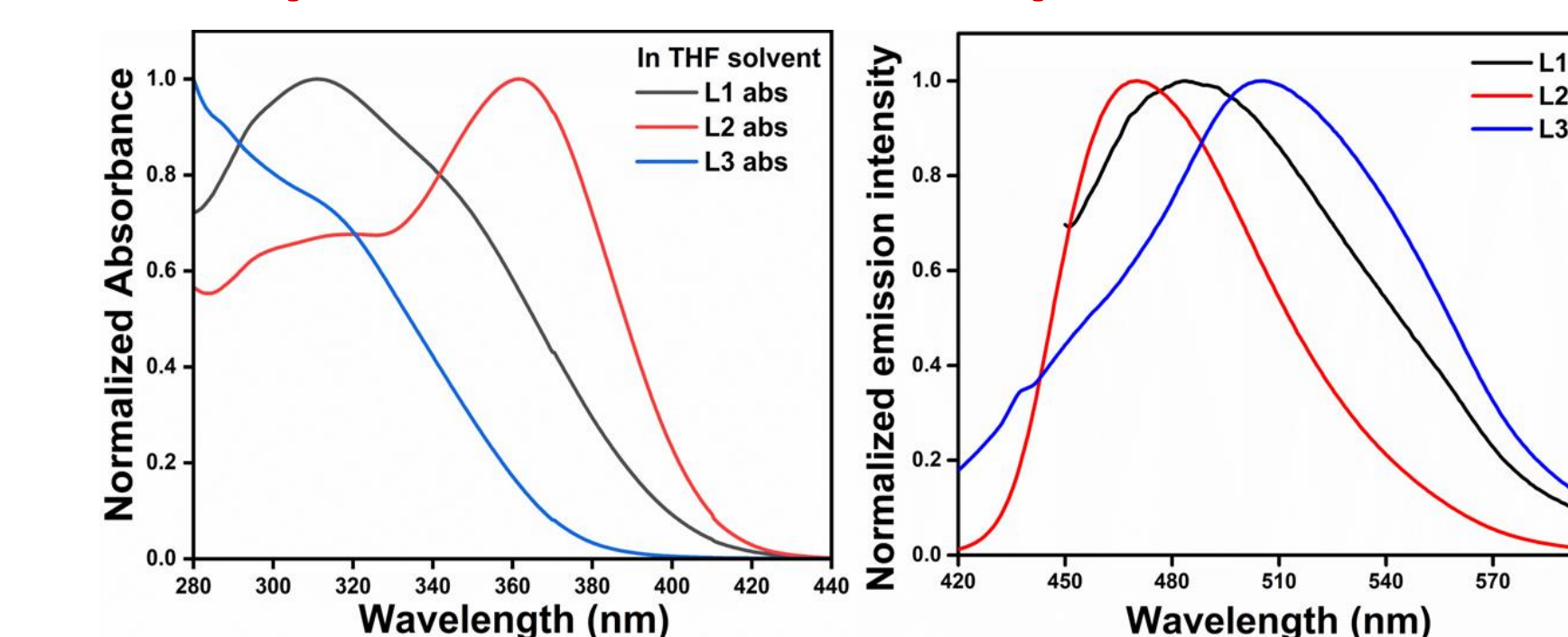
Molecular Design



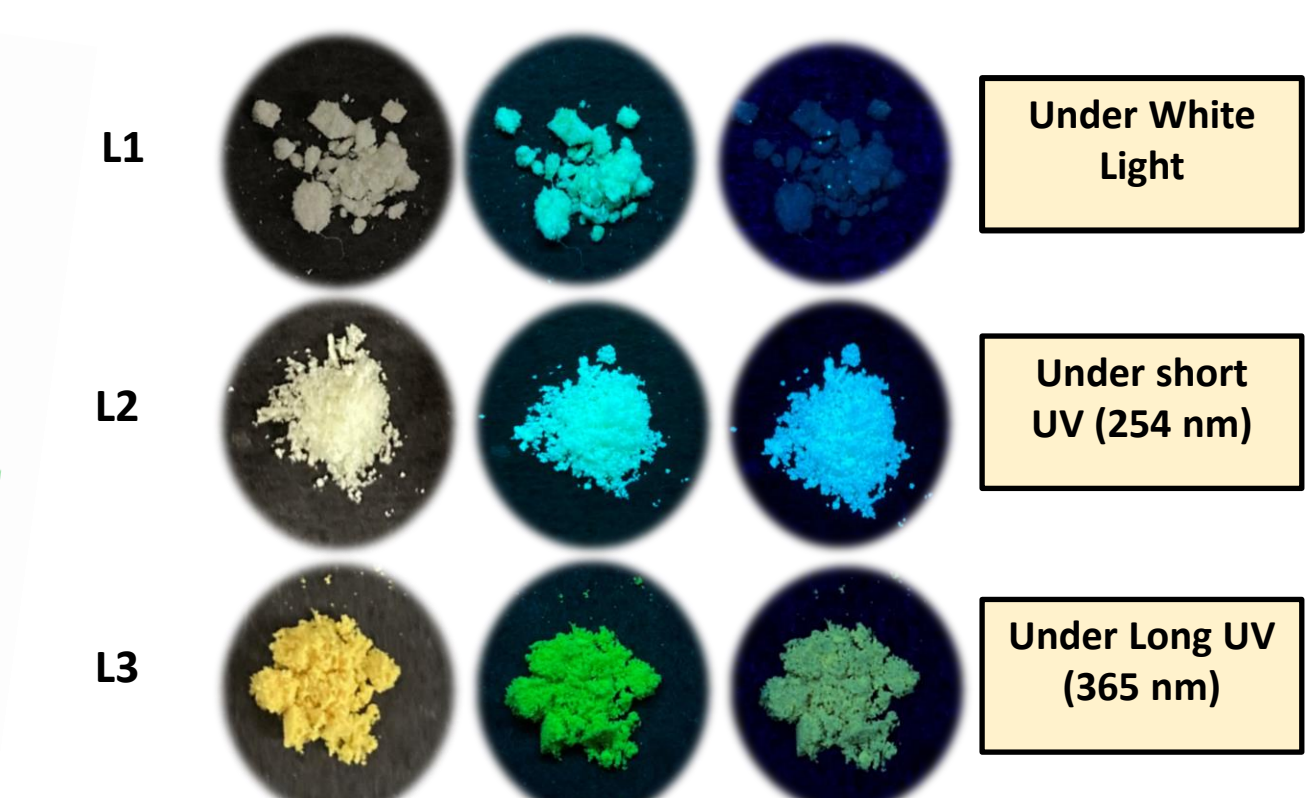
Synthetic Scheme



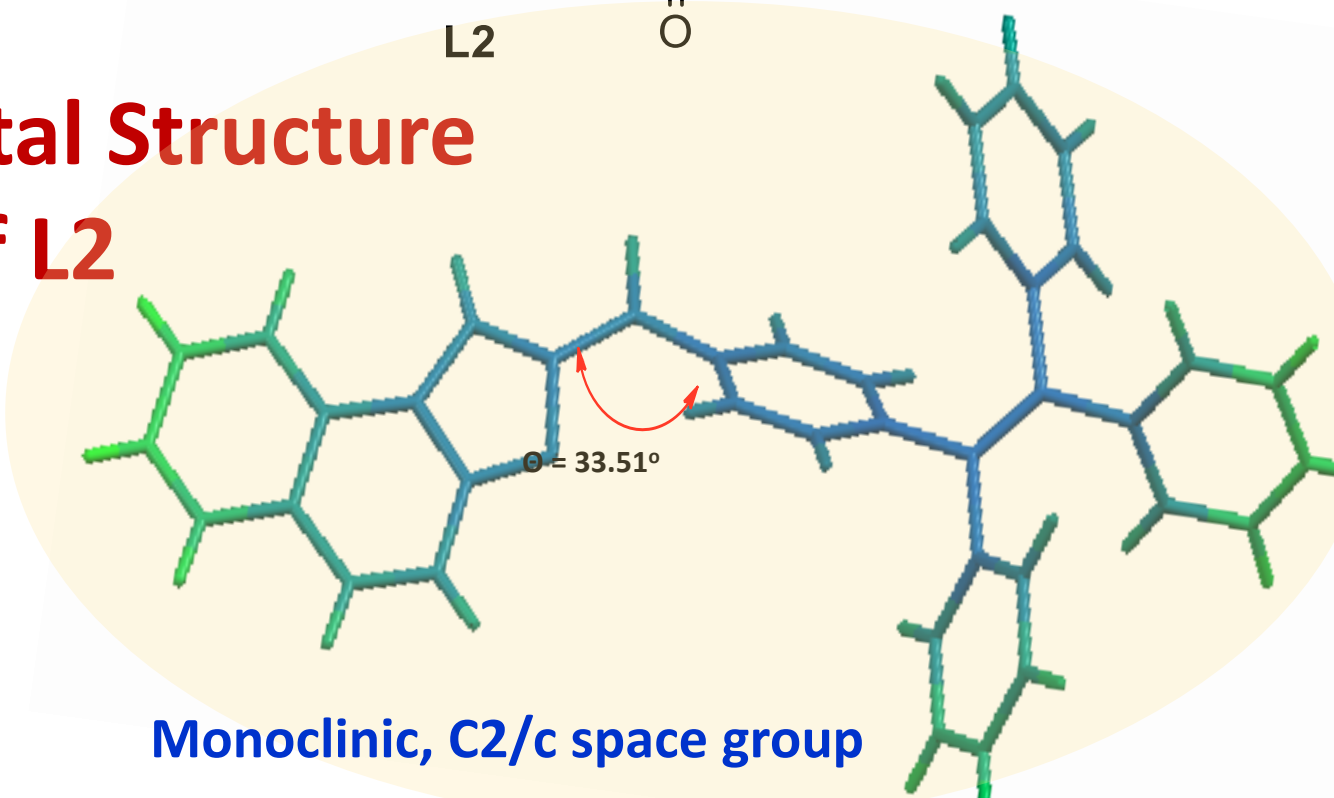
Absorption and Emission Spectra of L1-L3



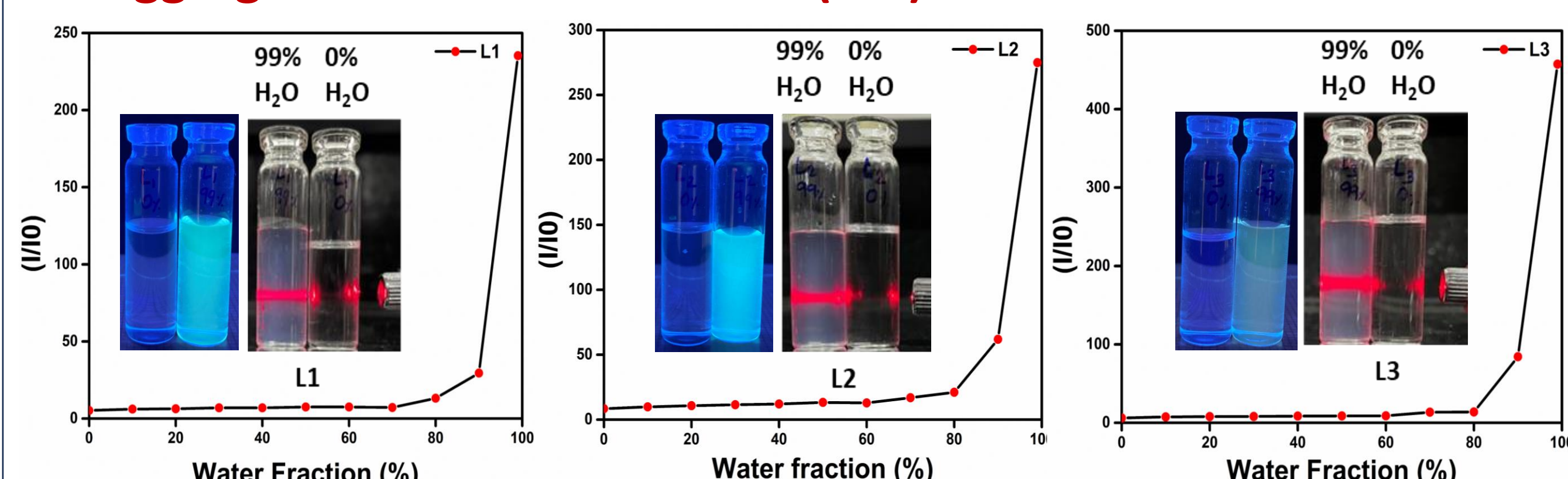
Emission of the powdered form of L1-L3



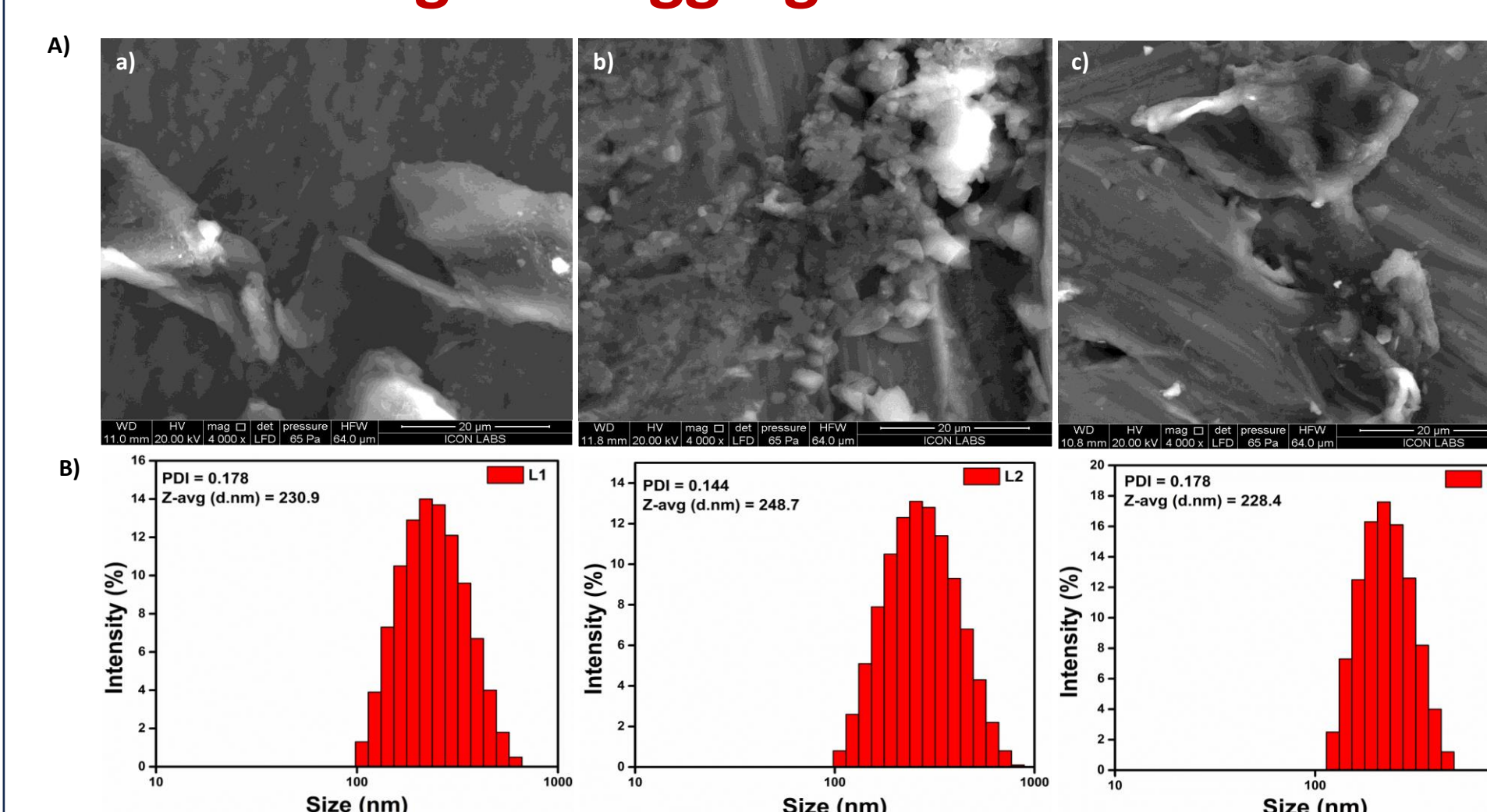
X-Ray Crystal Structure of L2



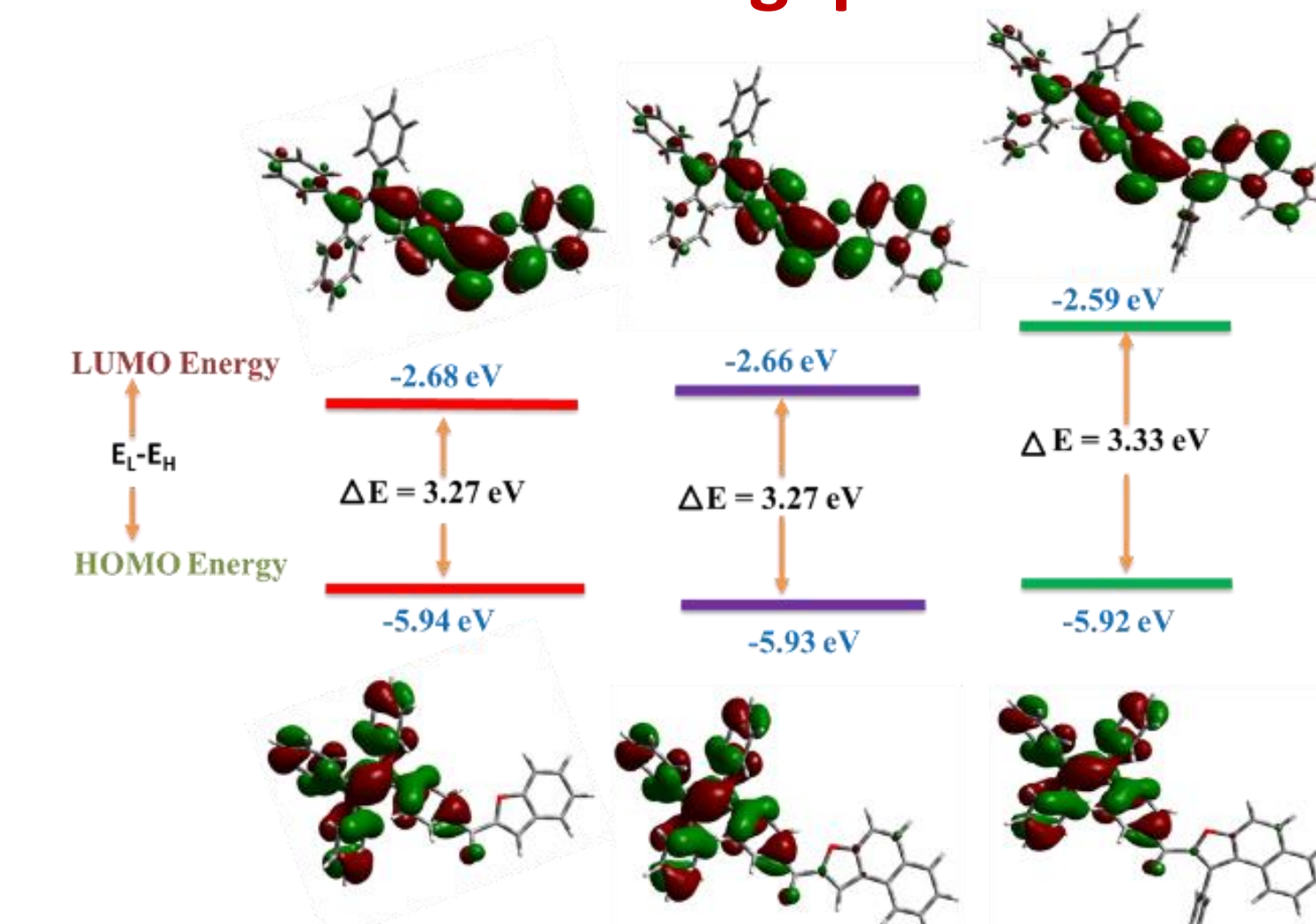
Aggregation Induced Emission (AIE)



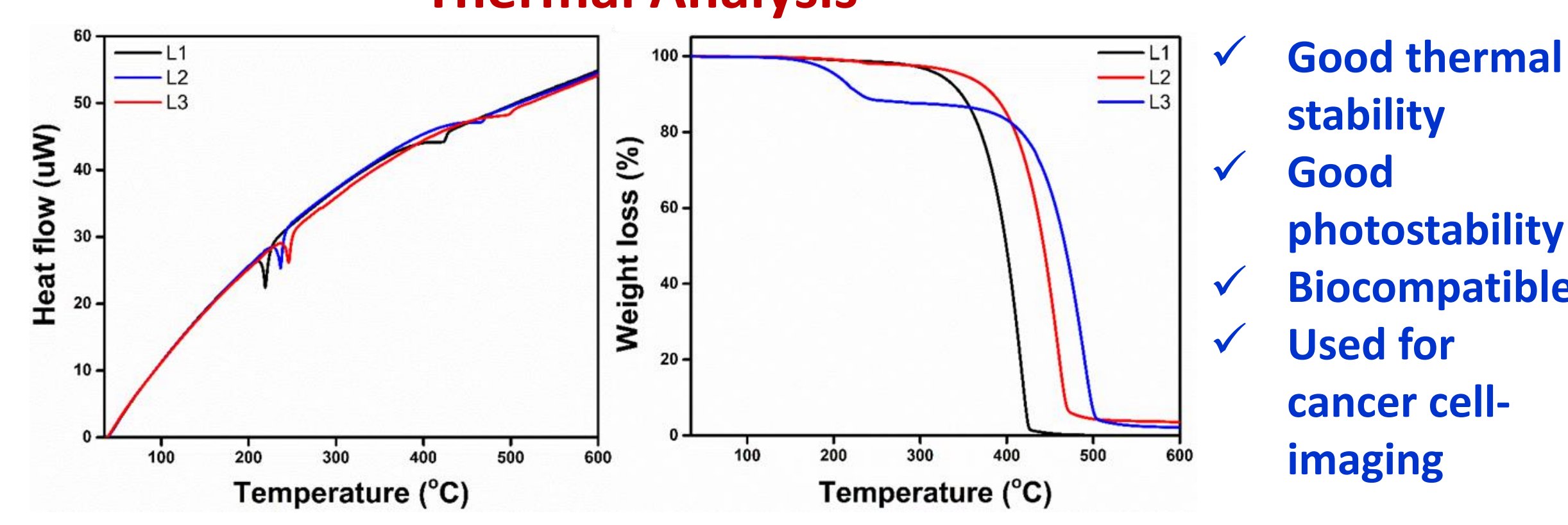
SEM images & Aggregates Size Distribution



HOMO-LUMO band gap and DFT Calculations

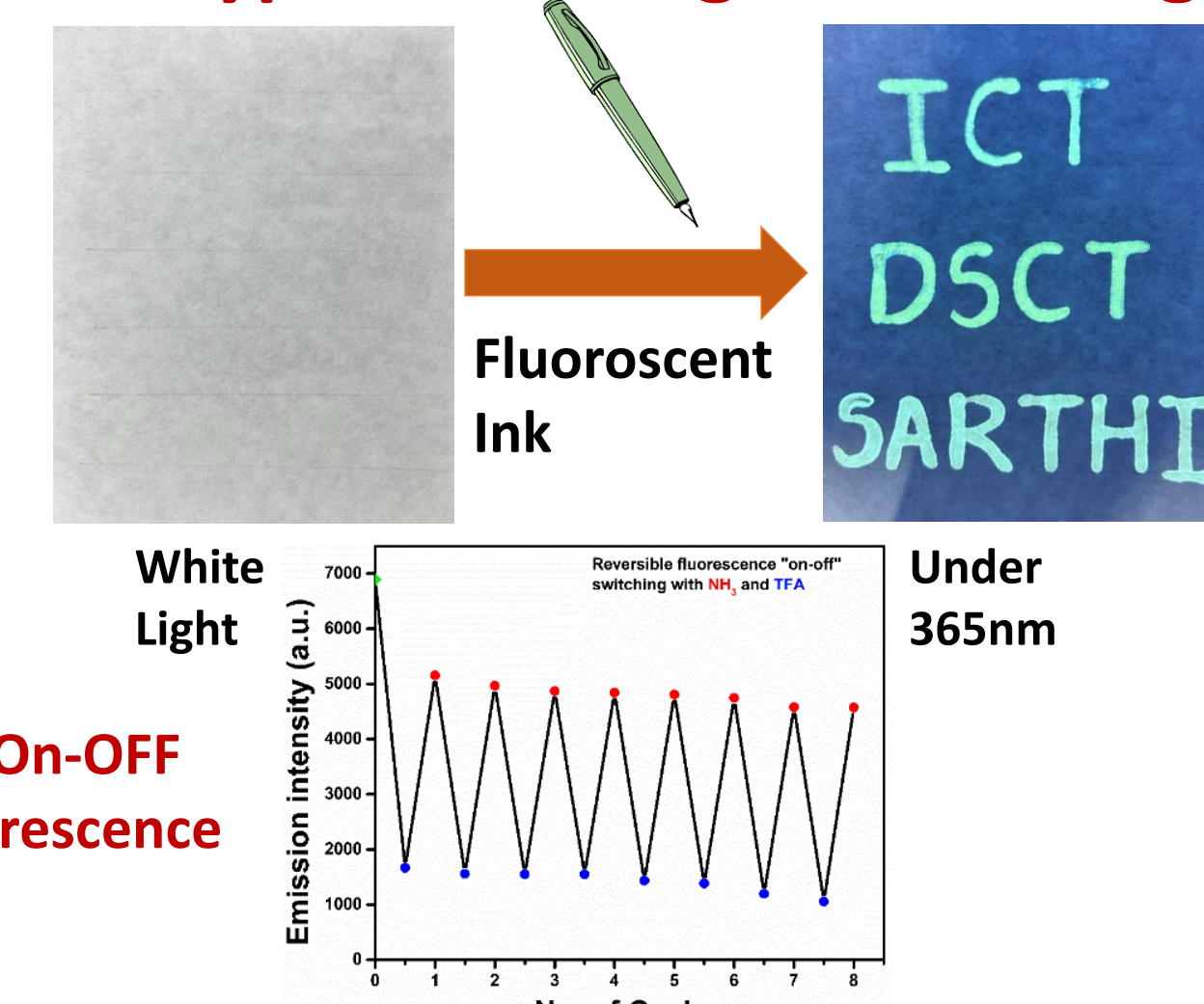


Thermal Analysis

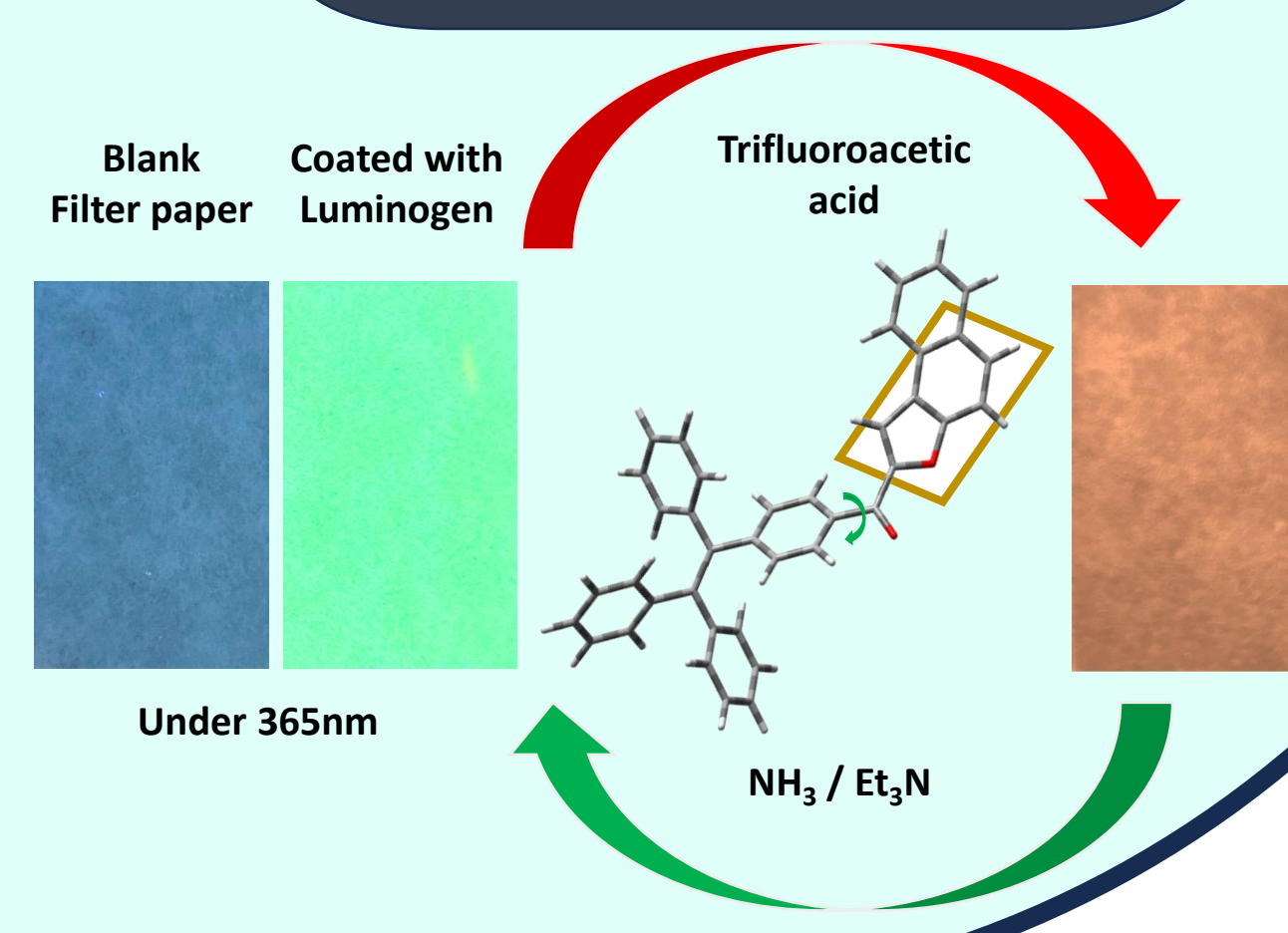


- ✓ Good thermal stability
- ✓ Good photostability
- ✓ Biocompatible
- ✓ Used for cancer cell-imaging

Encrypted Writing and Erasing



pH-responsive AIEgen



Over ripeness or fruit quality cannot be judged without opening the sealed container

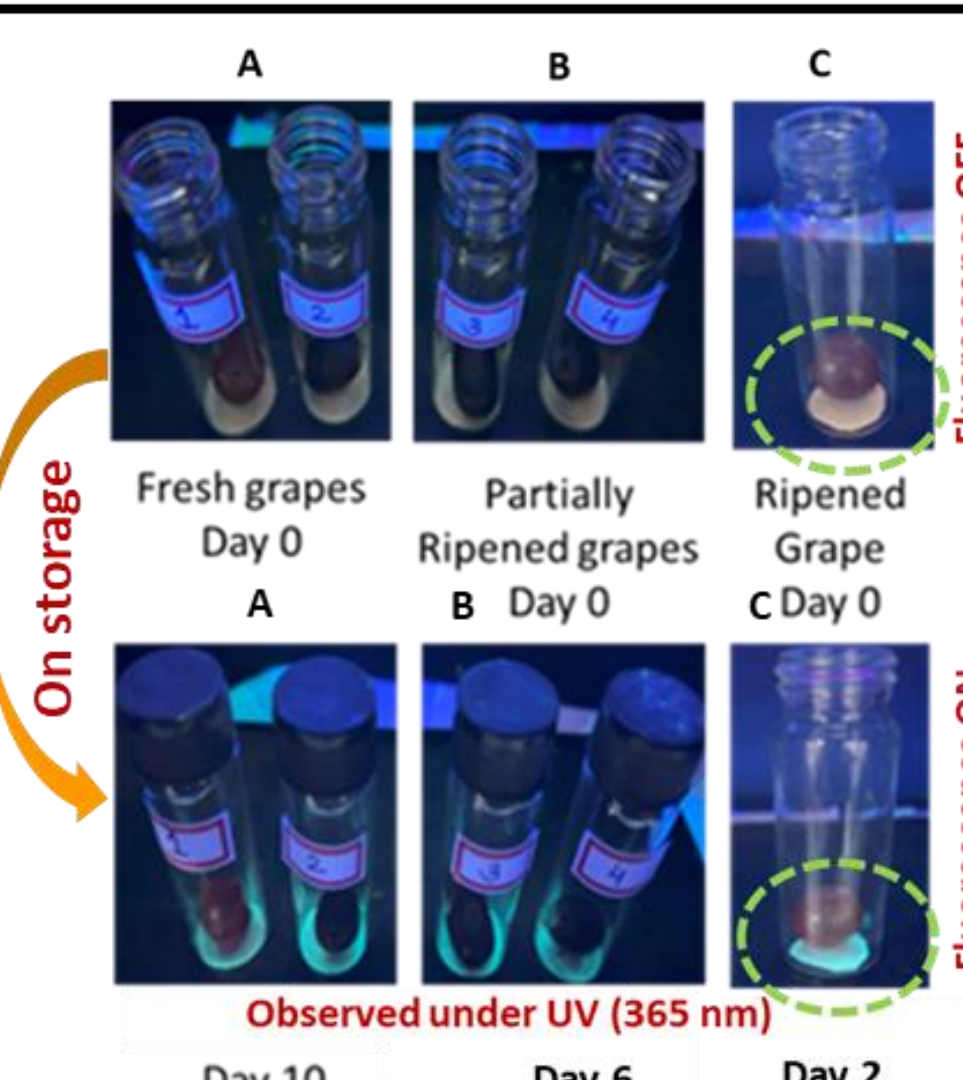
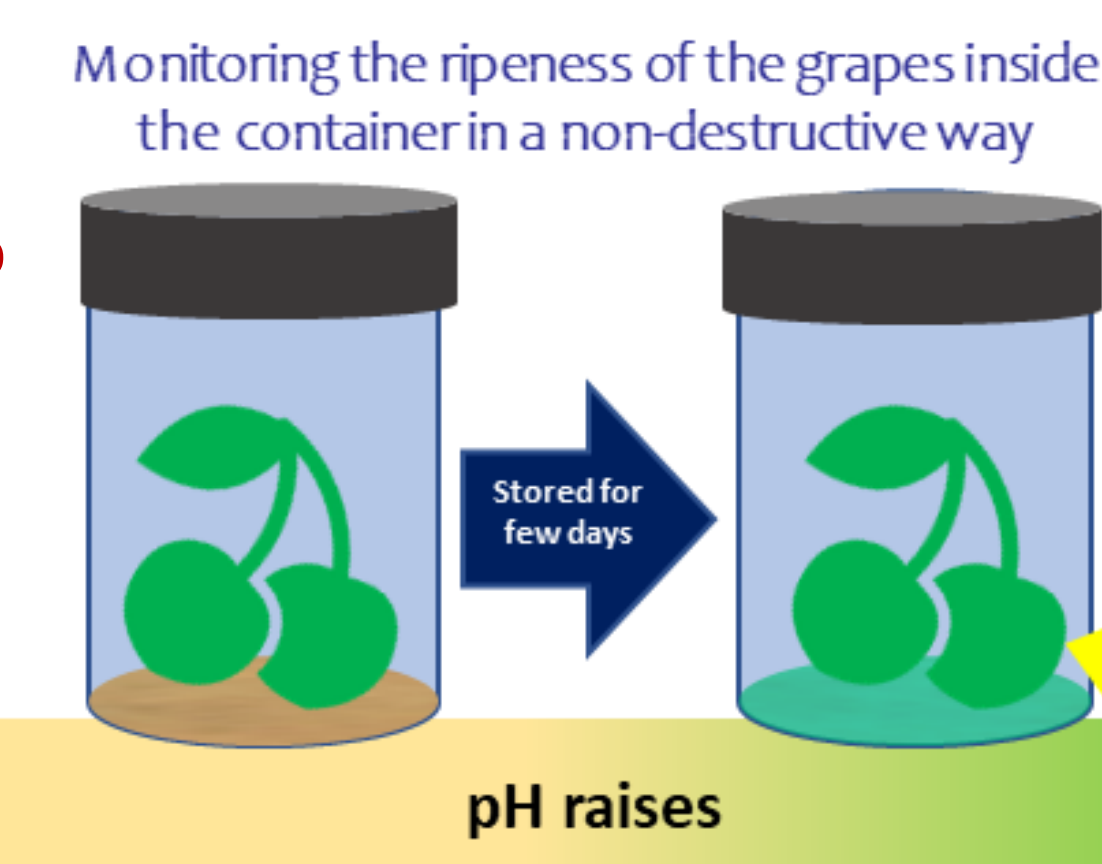
Non-destructive way of sensing the freshness of the packed fruits

1. Quality
2. Health
3. Wellness

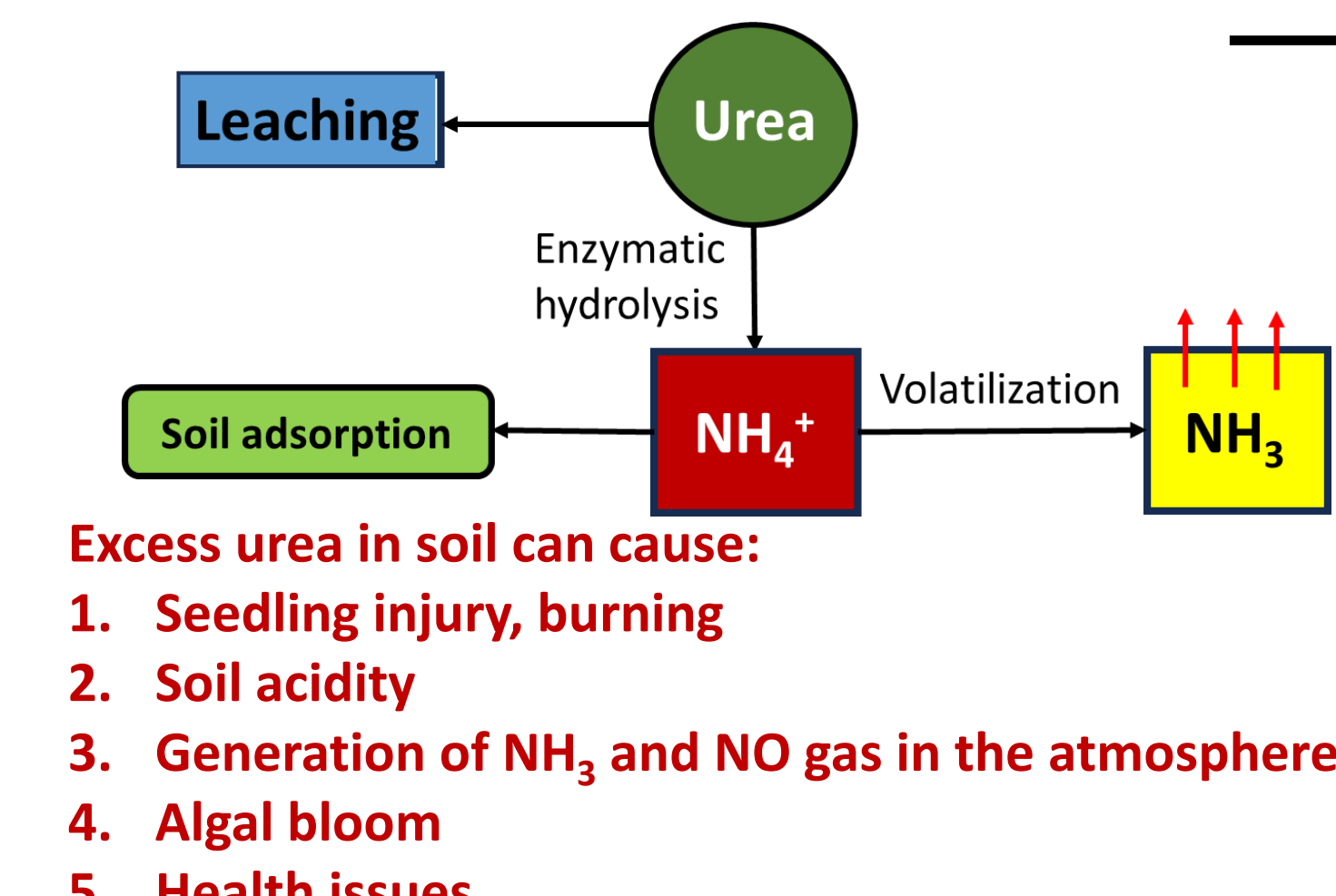


Grapes in sealed container

Luminogen L2 impregnated filter paper strip attached at the bottom surface of the container to monitor the released amine vapours upon overripening



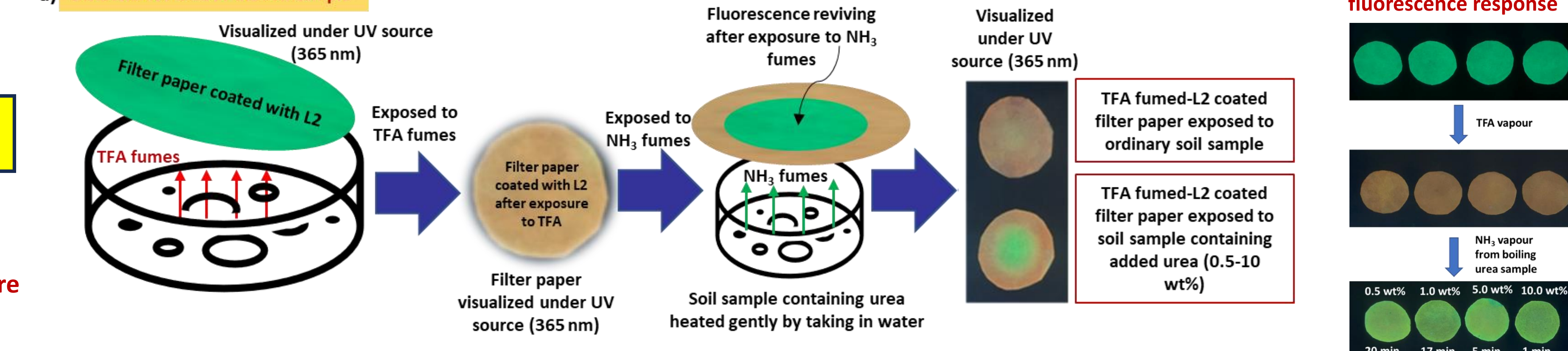
Urea loss from soil surface



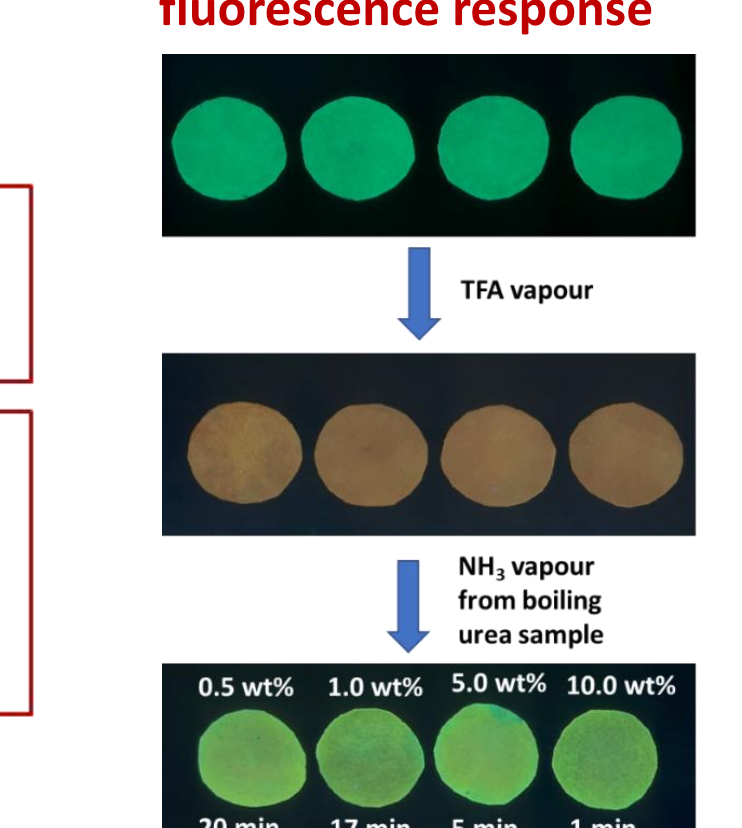
Excess urea in soil can cause:

1. Seedling injury, burning
2. Soil acidity
3. Generation of NH_3 and NO gas in the atmosphere
4. Algal bloom
5. Health issues

Detection of urea in the soil sample



Effect of the urea conc. on the fluorescence response



Conclusions

1. Developed benzofuran derived AIE luminogens
2. Paper strip-based sensing probes developed with L1-L3
3. The luminogens shows pH-responsive reversible fluorescence ON-OFF phenomenon

4. Luminogens can be used for anti-counterfeit applications
5. Paper based fluorescent probes used to monitor urea content in soil
6. Probes used to evaluate the food quality in packaged food in a non-destructive way

References

1. Saha *et. al.* *Dyes and Pigments* **2023**, 220, 111646

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