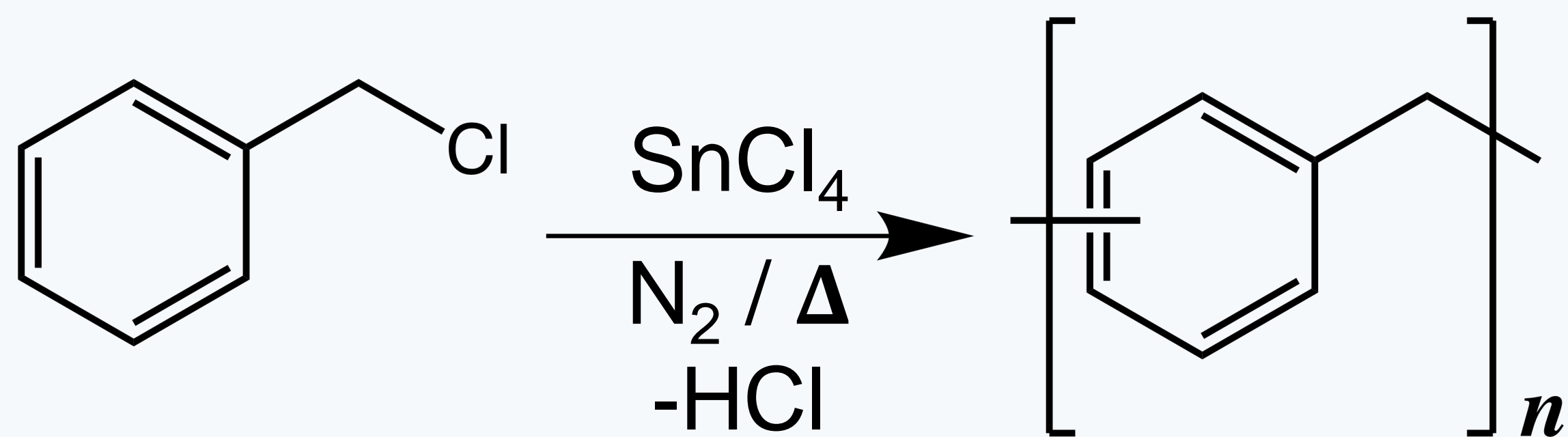


Poly(Phenylene Methylene) Based Co-Polymers: New Photoluminescent Corrosion-Protective Materials

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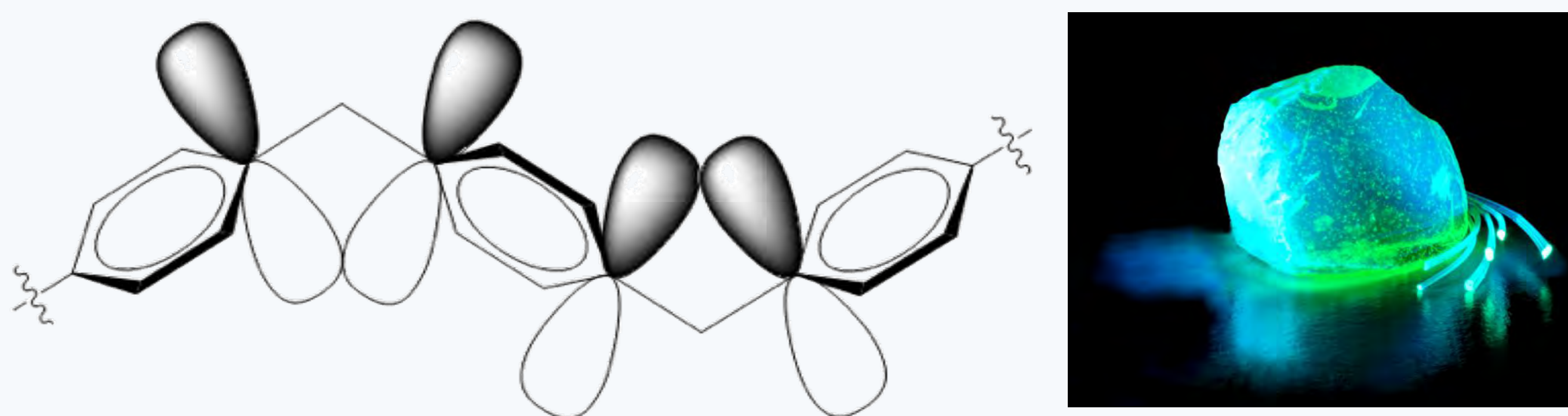
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Synthesis of PPM



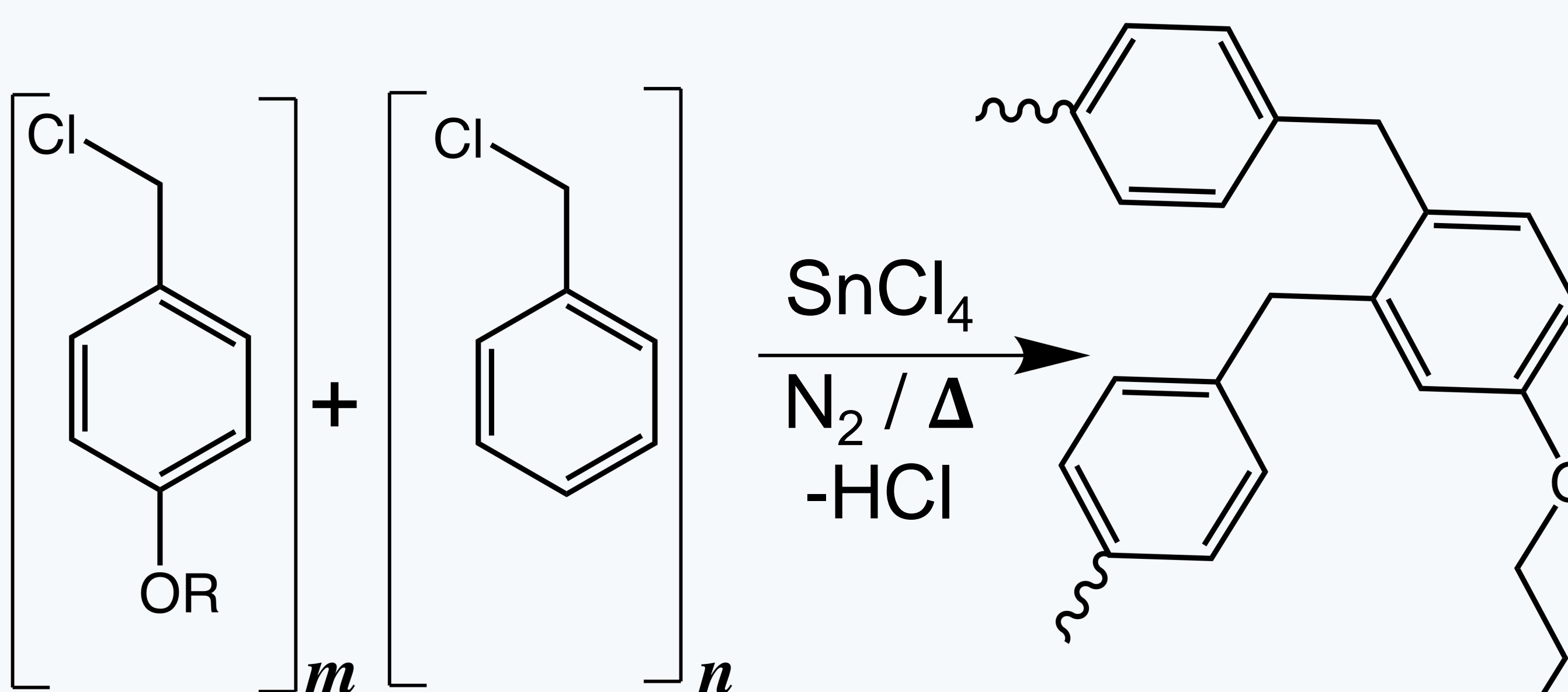
- Hydrophobic
- Thermally stable ($T_{dec, max} = 510\text{ }^{\circ}\text{C}$) $M_n \approx 10'000\text{ g/mol}$
- Fluorescent $T_g \approx 65\text{ }^{\circ}\text{C}$

Homoconjugation



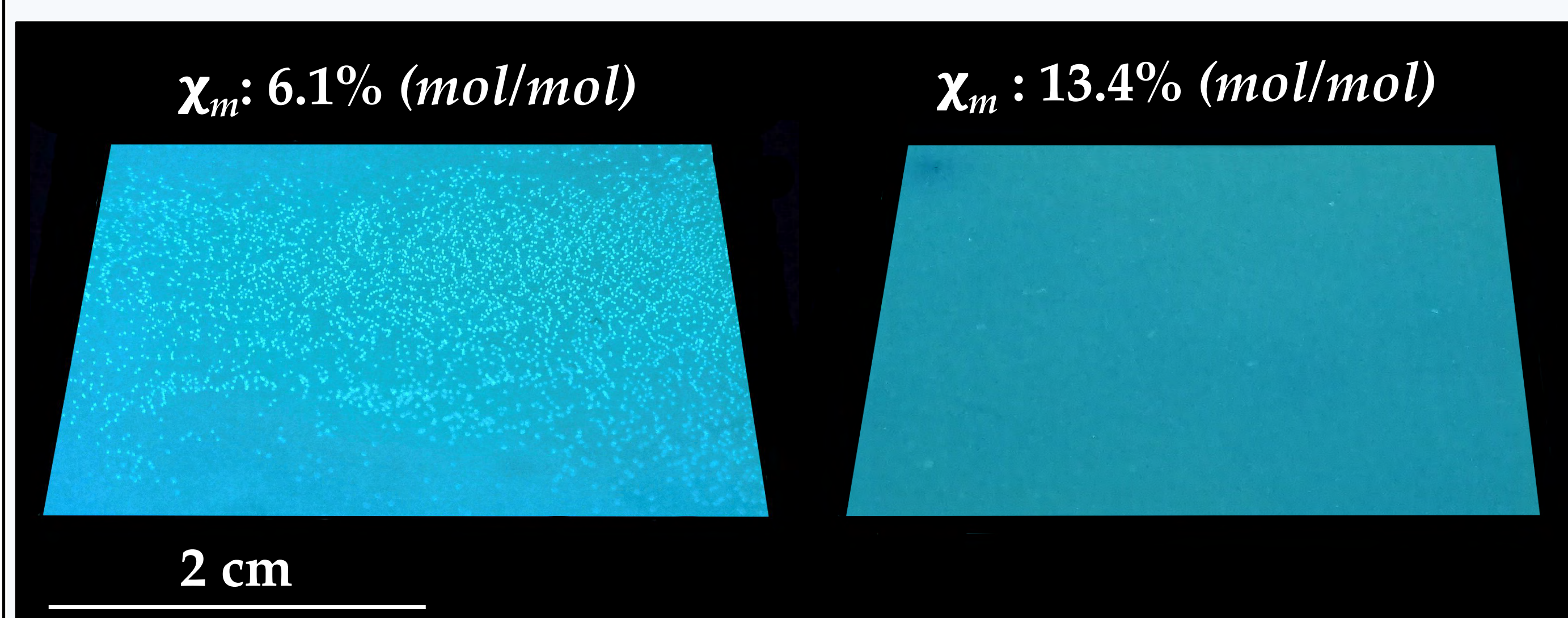
Homoconjugation: Overlap of adjacent p-orbitals separated by a non-conjugated group.^[1]

PPM based co-polymers



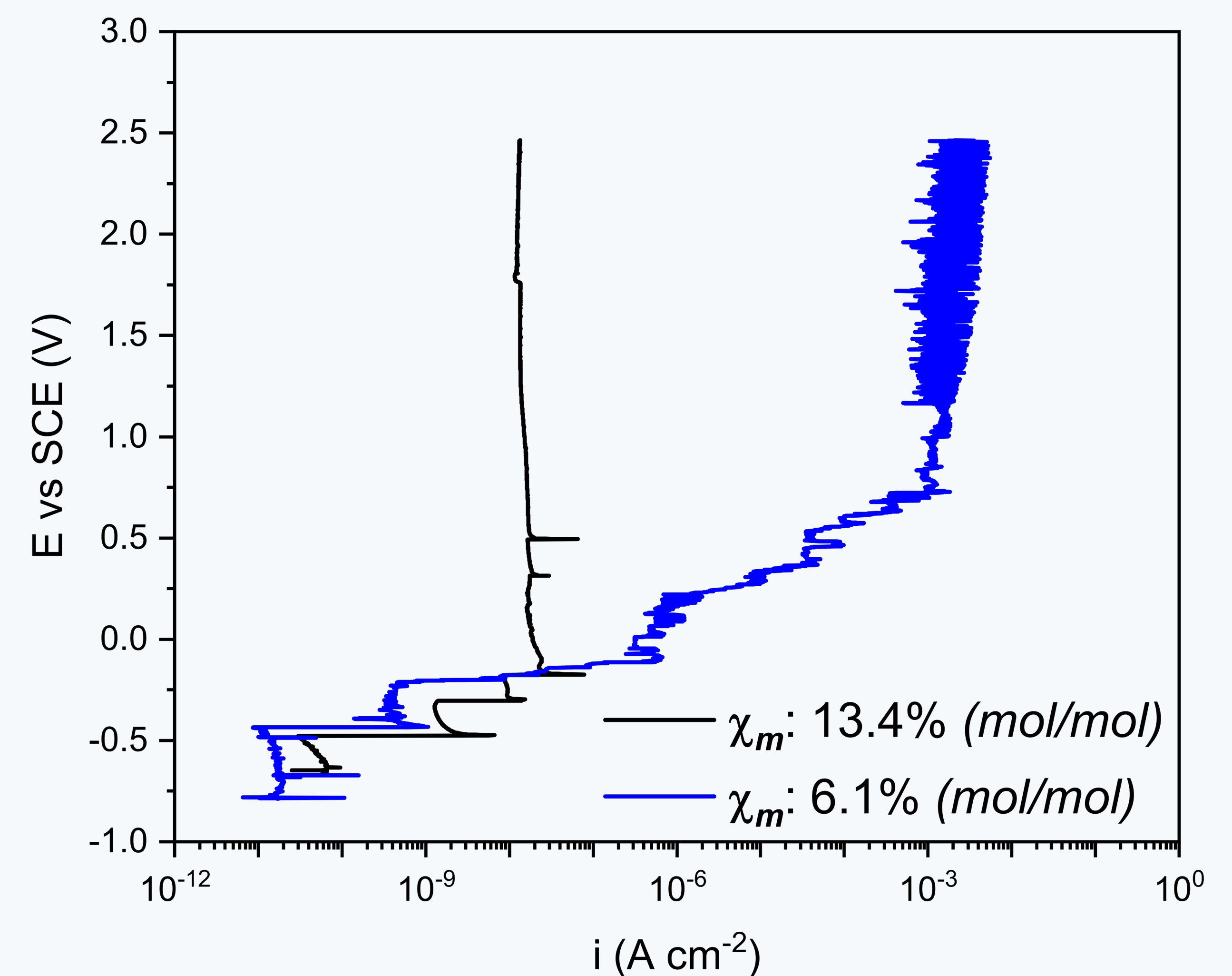
R: -octyl

- Addition of co-monomer m in different molar ratios χ_m .
- Increasing the molar fraction of octyloxy side chains:
 - T_g of copolymers decreases (up to $33\text{ }^{\circ}\text{C}$).
 - Melt viscosity decreases.
 - Improvement of film forming properties on the metallic substrate AA2024.

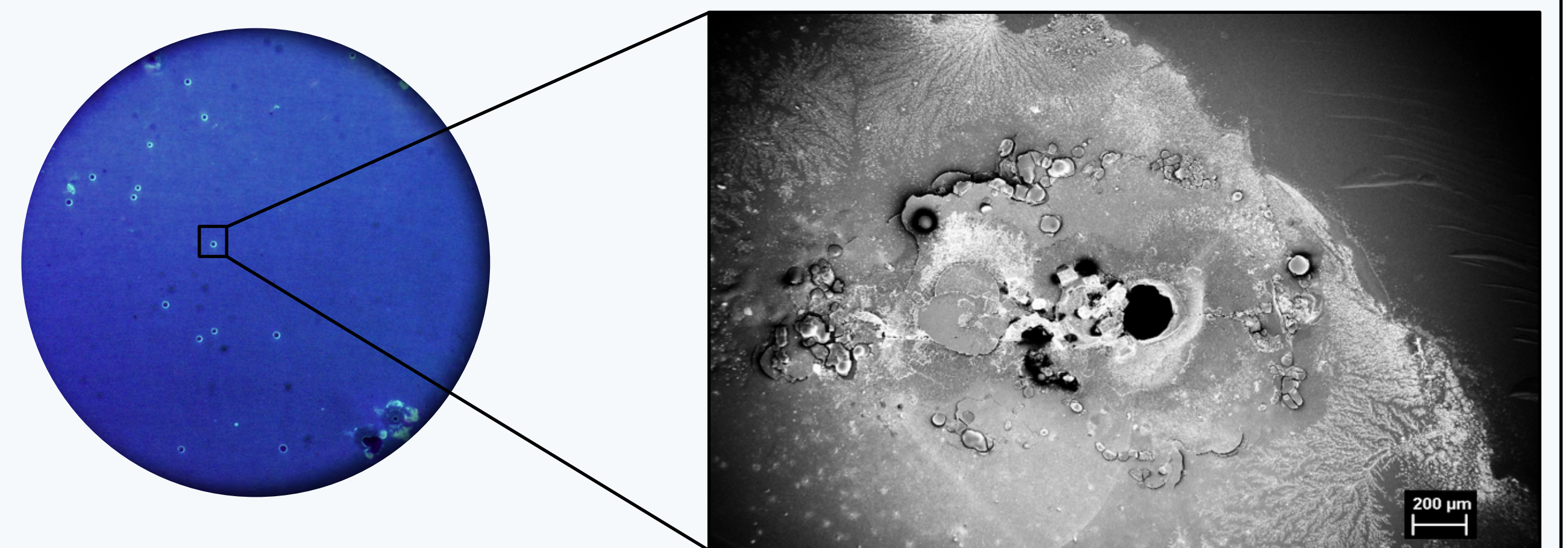


Anti-corrosion Test

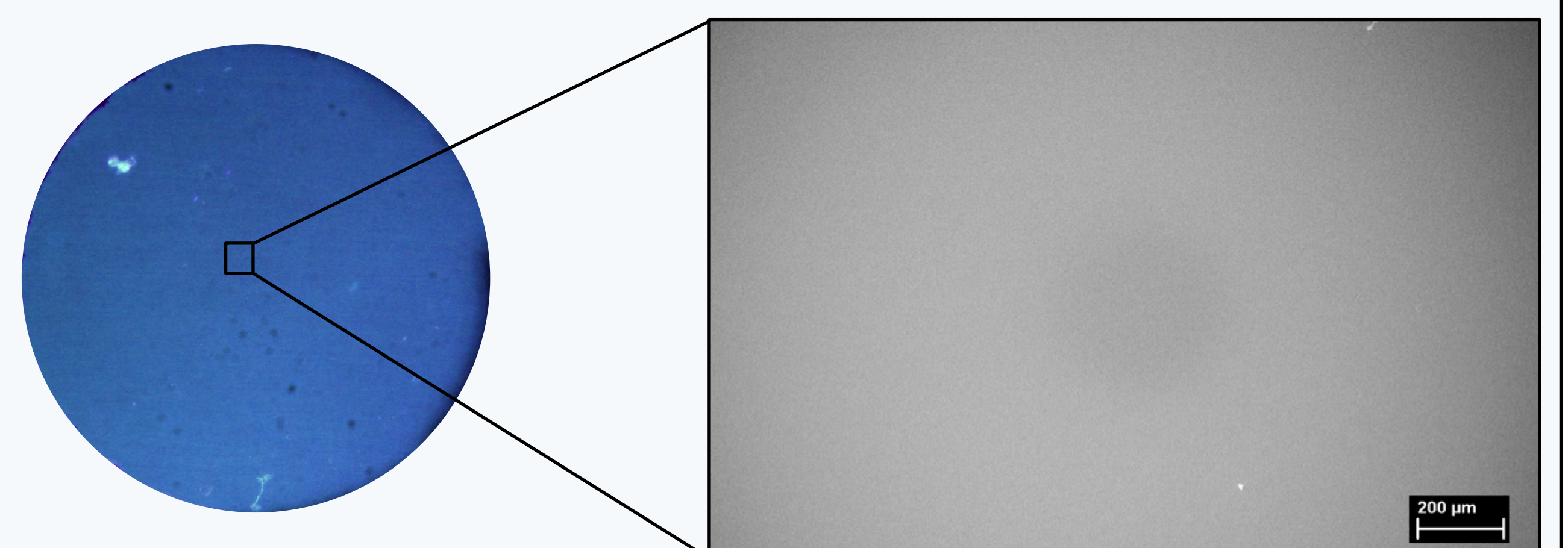
Cyclic polarization in a potential window from -0.5 to 2.5 V (vs SCE) on aluminum alloys (AA2024) coated with copolymers.



- PPM based copolymers containing 6.1% of 4-octyloxy units show a **limited corrosion protection** ability due to **defects** formed on the surface during the polarization tests.



- PPM based copolymers containing 13.4% of 4-octyloxy units exhibit **good isolation** of Al surface from **oxidizing environment** as a result of an almost complete **absence of defects** and **low porosity** level even after polarization tests.



Conclusions

- Lowering χ_m of alkoxy side chains leads to **excessive porous coatings** with **limited protection** ability against corrosion environment.
- Increasing χ_m , **compactness, cohesion** and **adhesion** of the coating are **improved**, resulting in **better protection** ability.

References

- [1] Braendle, A., Perevedentsev, A., Cheetham, N. J., Stavrinou, P. N., Schachner, J. A., Möscher-Zanetti, N. C., Niederberger, M. and Caseri, W. R.), *J. Polym. Sci. Part B: Polym. Phys.* **2017**, 707-720.
 [2] D'Elia, M.F.; Magni, M.; Trasatti, S.P.M.; Schweizer, T.B.; Niederberger, M. and Caseri, W. R. *Applied Science*. **2019**.