



June 1st, 2023 at 10 am

The 5th Nagoya University:
International Science Exchange Lecture



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Surface-Confined Terpyridine-based Monolayers for Ultra-durable Electrochromic Materials

Electrochromic (EC) devices based on transition metal complexes that do not require noble metals benefit from lower cost and colour tunability via molecular design. Although there is great progress in the development of well-defined EC metal complexes, the design of relevant multicoloured EC films remains a challenging task limited so far by metalorganic polymers. We have demonstrated a strategy that allows the creation of efficient and robust monolayer-based EC materials on surface-enhanced conductive metal oxide screen printed supports. We have observed that making minor changes to the ligand structure can produce materials with a wide range of colour variations. Furthermore, we showed that tuning the nature and porosity of the conductive surface support could lead to materials with extraordinary coloration efficiencies and ultra-long stability.¹

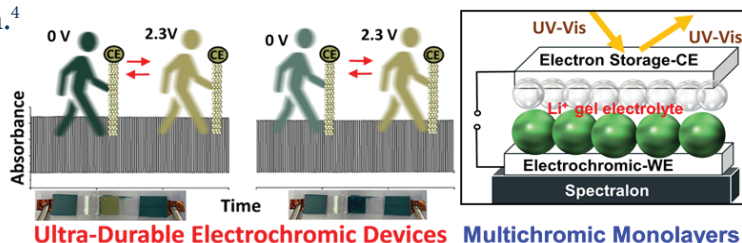
Here we report the deposition of different metal complexes on surface-enhanced conductive support and probe the ability to selectively address metal ions in these complexes to reach multiple colour-to-colour transitions within one film. We were able to sequentially switch between multiple coloured states and to demonstrate effective “colour mixing” on the surface by application of various deposition strategies. In addition, we demonstrated a successful on-surface post-modification approach to tune colours of the electrochromic monolayers and to reach desirable shades of green-coloured electrochromic materials for applications as camouflage materials.²⁻³

Finally, we explored the energy storage potential of our hybrid electrochromic devices and explored the role of the counter electrodes on the pathways of device degradation.⁴



References

1. Laschuk, N.O.; Zenkina, O.V., et al. *Mater. Advances* 2021, 2 (3), 953-962.
2. Laschuk, N.O.; Zenkina O.V., et al. *ACS Appl. Mater. & Interfaces* 2021, 13 (33), 39573-39583.
3. Laschuk, N.O.; Zenkina, O.V., et al *ACS Appl. Mater. Interfaces* 2020, 12 (37), 41749-41757.
4. Ahmad, R.; Zenkina, O.V., et al, *ACS Energy Mater.* 2022, 5 (4) 3905-3914.



Date: June 1st 2023, 10:00 am on Teams

Research fields: Electrochromic materials,
surface science, energy storage



Designated research groups':

- ★ Students (B + M + PhD)
- ★ All research staff
- ★ Researchers from other faculties welcome

Lecture time: 1 hour

- Introduction of speaker by NU host (1-5 min)
- Lecture on research interests & results
- Presentation of unsolved problems that require input or collaboration
- Discussion & questions on b. + c.

Registration:



About NU:ISE

Early career scientists from international institutes are invited to give a lecture on their research. The talk will include both published results and current open questions, with the aim of promoting discussion and potentially starting new collaborations. In the name of 'Science Exchange', the hosting group is encouraged to nominate a candidate from their network (from NU) to give a talk at the invitee's institute, either within the same or a different research group.

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