Cesium salt extraction and deposition by a photoswithcable calix[4]pyrrole receptor

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Abstract oral / poster presentation

Selective removal of cesium salts from wastewater remains a significant challenge in industry. Calix[4]pyrrole macrocycles are promising extracting agents as they show high binding affinity and selectivity towards anions and cesium ion pairs.[1] Nevertheless, while very high affinity is desired for efficient extraction, it hampers recyclability and recovery of the substrate. An effective strategy to overcome this issue,[2] recently developed in our group, is to introduce a photoresponsive strap such that low-affinity and high-affinity states can be addressed by light.[3] A drawback of the current system is the use of damaging UV light and low photo-stationary state ratios, which hamper its efficiency as an extractant. To address these issues, we have introduced *Z*-diazocine as a bridging unit. Here, we present two diazocine-strapped calix[4]pyrrole receptors, which can be switched over multiple cycles between high and low binding affinity states using visible light irradiation. Both *Z*-isomers strongly bind chloride and bromide anions in 1:1 stoichiometry. Exposure of the host-guest complexes to 405 nm, leading to formation of the respective *E*-isomer, results in anion release. The receptor with a longer spacer is shown to function as an effective extractant of cesium bromide. This work opens up a new photo-modulable approach to extraction and deposition of cesium salts, which eventually will help to reduce the volume of waste streams.

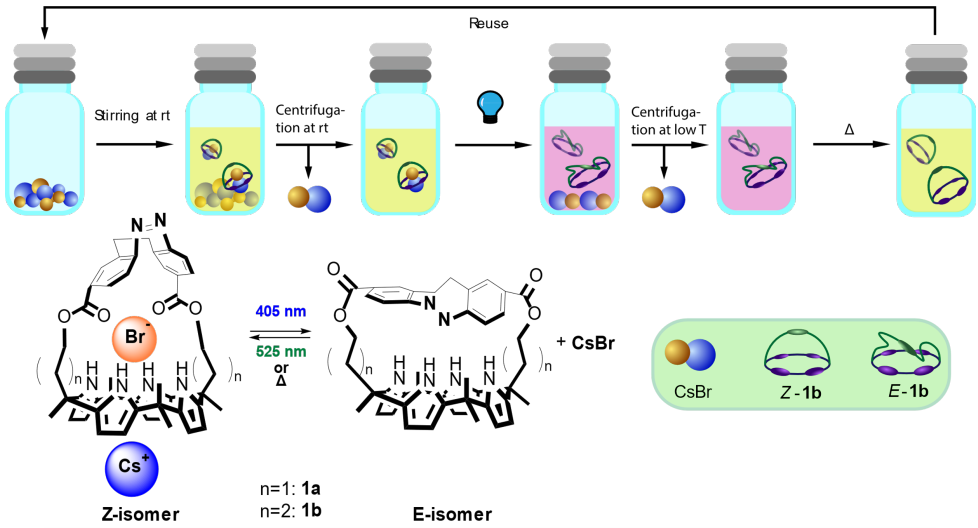

Figure 1. *Cesium bromide extraction by Z-diazocine strapped calix[4]pyrrole receptor.*

Acknowledgements

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References

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