Controlling rotary motion of molecular motors based on oxindole

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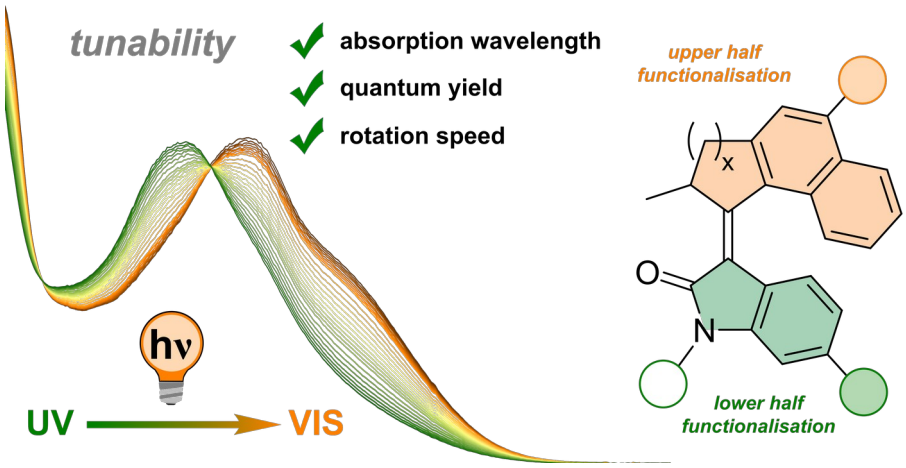

Molecular motors are essential components of artificial molecular machines, which can be used to manipulate and amplify mechanical motion at the nanoscale to create machine-like function. Since the discovery of light-driven rotary molecular motors, the field has been widely developed, including the introduction of molecular motors based on oxindole by our group in 2019.[1,2] The rotational properties of molecular motors, e.g. absorption wavelength, quantum yield and rotation speed, often critically depend on substituent effects.[3] Up to now, the substituent effects of oxindole-based molecular motors have not yet been investigated. Herein, we present a family of oxindole-based molecular motors functionalised at three different positions on the motor core, with either CN or OMe groups. The motors prepared in this work retain the favourable features of oxindole-based motors, i.e. simple synthesis and visible light addressability. We find that functionalisation has substantial effects on the absorption wavelength of the motors, meanwhile the rotation speed is unaffected. Furthermore, we found that functionalisation of the oxindole molecular motors increases their quantum efficiency considerably in comparison to previous motors of their class.[4]

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