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# Molecular Motors in Smart Drug Delivery Systems

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**Abstract :** Stimuli responsive systems arise from the need to meet unsolved needs of current molecular drugs. Our study presents the design of a delivery system with high spatiotemporal control and tuneable release profiles. We study the incorporation of a hydrophobic synthetic molecular motor into PDMS-b-PMOXA block copolymer vesicles to create a self-assembled system. We prove their successful incorporation and selective activation by low powered visible light (λ 430 nm, 6.9 mW). We trigger the release of a fluorescent dye with high release efficiencies over sequential cycles (up to 75%) with the ability to turn on and off the release behaviour on demand by light irradiation. Low concentrations of photo-responsive units are proven to trigger release down to 1 mol% of molecular motor. Finally, we test our system in relevant physiological conditions using a lung cancer cell line and the encapsulation of an approved drug. Similar levels of cell viability are observed compared to the free-given drugshowing the potential of our platform to deliver functional drugs on demand with the same efficiency and lower toxicity.

**Keywords :** molecular motor, polymer, drug delivery, light-responsive, cancer, selfassembly
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