Lysosome-targeted photoresponsive drug delivery system with "AIE + ESIPT" induced Light-Up characteristics for the efficient cancer therapy

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Subcellular organelle-specific systems for simultaneous tumor targeting, imaging, and treatment are of prime interest in cancer therapy.[1] Herein, we designed and developed a lysosome targeted anticancer drug delivery system (DDS) by appending morpholine with the basic fluorophore which shows AIE[2] (aggregation induced emission) as well as ESIPT[3] (excited state intramolecular proton transfer) phenomenon. Due to the presence of AIE + ESIPT process, the designed system shows several advantages like large stokes shift, reduced self-quenching and excellent light-up ratio. On the other hand, p-hydroxy phenacyl[4] (pHP) group present in the system provides precise control over the drug release upon irradiation of visible light ($\geq$ 410 nm). In addition, ESIPT process assist the deprotonation of the phenol moiety of pHP group leading to an efficient and faster release of the anti-cancer drug chlorambucil. In *vitro* biological studies revealed that our photoresponsive DDS can selectively accumulate in cancer-cell lysosome, light-up its fluorescence followed by clean delivery of the anticancer drug chlorambucil upon irradiation inside the tumor cell.

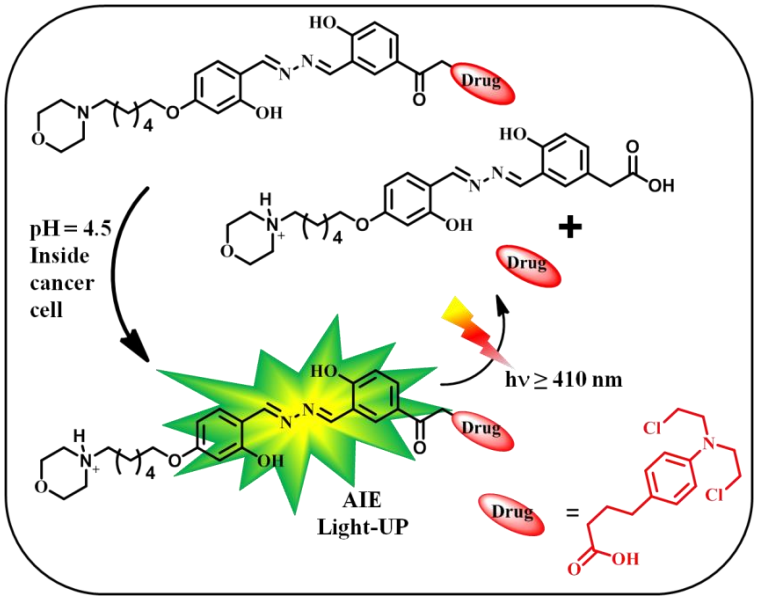

Figure 1: Working protocol of the DDS as lysosome targeted AIE + ESIPT based drug delivery system.

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