# Dual pH- and Thermo- Responsive Alternating Copolymer with Unusual Fluorescence Behaviour

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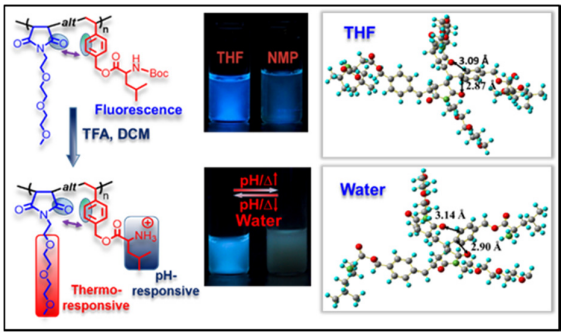
In recent years, the intrinsic emission from nonconventional macromolecular luminogens without classic conjugated chromophores have drawn increasing interests owing to their fundamental importance and promising applications. Also, stimuli-responsive polymers (especially pH and or temperature) have been developed for various interesting applications.Amalgamation of the fluorescence property of unorthodox macromolecular luminogens with "smart" stimuli-responsiveness in a single polymer system will give a new class of polymeric material with diversified functions.Herein, we report a new approach for the synthesis of a novel dual pH- and thermo- responsive fluorescent alternating copolymer devoid of conventional fluorophore moiety based on a sequence-specific copolymer of Boc-protected leucine appended styrenic monomer and *N*-substituted maleimide monomer bearing diethylene oxide side-chain.The reversible-addition fragmentation chain transfer (RAFT) polymerization ensured the alternate placing of the monomer unit throughout the polymer chain, which was confirmed by $^{13}C$ NMR spectroscopy and MALDI-TOF-MS. The as-synthesized alternating copolymer exhibits a bright-blue fluorescence in organic solvents.After expulsion of Boc group, the resultant copolymer showed dual pH- and thermo-responsive behaviour and retained its luminescence property in organic solvents as well as in water. Interestingly, the fluorescence activity of the copolymer has shown to be very sensitive towards pH and temperature. The origin of the fluorescence in the copolymers was ascertained by density functional theory (DFT), where we observed that the "through-space" π-π interaction between the benzene ring and the neighbouring carbonyl group of maleimide unit is responsible for the unexpected fluorescence into the alternating copolymer.

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