

# Pharmaceutics and Novel Drug Delivery Systems

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## Smart nano-hydrogel as potent carrier in drug delivery

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**A**mong various dedicated nanoparticles for drug delivery applications, hydrogels have been mostly studied. Hydrogels are 3D structure with high water-content capacity that made up of hydrophilic polymers. In addition, hydrogels have significant physicochemical properties, such as permeability, porosity, physical interactions and some smart ones are capable to make response to environmental stimuli like temperature, pH and ionic strength. Poly vinyl caprolactam (PVCL) as one of the most extensively studied thermoresponsive polymer, has a continuous coil-to-globule phase transition behaviour with the lower critical solution temperature (LCST) ranging from 32 to 50°C, which depends on PVCL molecular weight and concentration. Herein, novel temperature and pH responsive hydrogel based on PVCL were prepared system via reversible addition-fragmentation chain-transfer polymerization, where poly(ethylene glycol) diacrylate served as cross-linker, and lysine used as temperature modifier and drug linking agent. The as prepared platform was characterized by <sup>1</sup>H NMR and FT-IR and molecular weight characterization was performed by size exclusion chromatography. Doxorubicin, as an anti-cancer drug was conjugated to lysine moiety of as-prepared structure

via Schiff-base reaction. The temperature-responsiveness activity was evaluated via differential scanning calorimetry and dynamic light scattering. The morphology changes in regard of temperature changes were observed by transmission electron microscopy. *In vitro* release pattern in simulated medium of healthy organs and tumor site was evaluated. The anti-cancer efficiency of drug conjugated structure was assessed in breast cancer cell line (MCF-7) in 24 and 48 h, and cell uptake assay was performed on the same cell line.

### Biography

Fatemeh Farjadian has completed her PhD in 2012 from Shiraz University in the field of Polymer Chemistry and during her studies attended sabbatical leave in Duisburg-Essen University. She is a Faculty Member in Shiraz University of Medical Sciences and her scientific fields of studies are focused on synthesis of smart nanoparticles and evaluating their pharmaceutical trends. She has published more than 21 papers in reputed journals and has been serving as an invited author of book chapter entitled "Smart Stimuli-responsive Nano-sized Hosts for Drug Deliver" in the book of *Industrial Applications of Intelligent Polymers and Coating* from Springer publications.

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