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## Amphiphilic polymeric nanoparticles for drug delivery

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Amphiphilic block copolymers and ABA type PEG-Lipid conjugated macromolecules have been synthesized using microwave-assisted reversible addition-fragmentation chain transfer (RAFT) polymerization and the copper-catalyzed azide-alkyne cycloaddition commonly termed as “click chemistry”, respectively. Characterization of the block copolymers and conjugates has been carried out with the help of <sup>1</sup>H-NMR, FTIR and GPC. These copolymers and conjugates were evaluated for the encapsulation and release of drug. Carbamazepine, an anticonvulsant drug with poor water solubility was selected to be a hydrophobic drug model in the study. The micellization, drug encapsulation and release behavior of macromolecules was investigated by dynamic light scattering (DLS), transmission electron microscope (TEM) and fluorescence spectroscopy. From the results, it has been concluded that the nanoparticles had different average sizes due to different ratio of hydrophilic contents in the block or conjugate backbone. The particle size and structure could be altered by changing the ratio of hydrophilic and hydrophobic contents. The in vitro drug encapsulations highlighted that all the drug-loaded micelles had spherical or near-spherical morphology. In vitro drug release study showed the controlled release of hydrophobic drug over a period of max. 70 hours. The results indicate that there is great potential of renewable lipid-based micelle nanoparticles to be used as hydrophobic drug carriers.

## References

1. Fang et al. (2013) Nanostructured lipid carriers (NLCs) for drug delivery and targeting. *Recent Pat Nanotechnol*; 7(1): 41-55.
2. Nishiyama et al. (2006) Current state, achievements, and future prospects of polymeric micelles as nanocarriers for drug and gene delivery. *Pharmacol Ther*; 112(3): 630-48.

## Recent Publications

1. Arshad M, Pradhan RA, Ullah A (2017) Synthesis of lipid-based amphiphilic block copolymer and its evaluation as nano drug carrier. *Mater. Sci. Eng. C*; 76: 217-223.
2. Zhang S, Arshad M, Ullah A (2015) Drug encapsulation and release behavior of telechelic nanoparticles. *Nanotechnology*; 26: 415703.

## Biography

Aman Ullah has received his PhD in Chemical Sciences and Technologies in 2010 at the University of Genova, Italy by working together at Southern Methodist University, USA. He worked as a postdoctoral fellow before accepting an Assistant Professor position at the University of Alberta. He has been promoted to Associate Professor with Tenure. He has been teaching a graduate course entitled “Renewable Biomaterials”. He has published more than 40 papers in reputed journals and three patents/patent applications. His research is focused on the development of biochemicals, biopolymers/biomaterials from lipids and other renewable resources.

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