Doctoral in Chemistry Dissertation Defense

Presents a Defense Titled:

"Synthesis, Characterization and Applications of Carbohydrate Based Low Molecular Weight Gelators"

Presented by:

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The main aim of the research focuses on the synthesis and characterizations of monosaccharide derivatives that are potentially useful as low molecular weight gelators (LMWGs). LMWGs are able to self-assemble into spheres, fibers, sheets, and micelles in a wide variety of solvents and result in new classes of soft materials. The self-assembly occurs through non-covalent forces such as hydrogen bonding, π-π stacking, and van der Waals forces. Carbohydrate based gelators have many applications such as drug delivery, environmental clean-up, and even for reaction catalysis. Previously, our lab has reported that several series of 4,6-O-benzylidene protected D-glucose and N-acetyl-D-glucosamine are effective molecular gelators. In order to probe whether the benzylidene functional group is a structural requirement for gelation, in this research, the phenyl group was replaced with aliphatic functional groups. Therefore, a series of 4,6-O-alkylidene protected N-acetyl-D-glucosamine and α-D-methyl glucoside were synthesized and their gelation properties were studied. Depending on the structures of these derivatives, effective LMWGs in aqueous and organic solvents were obtained. The effective hydrogelators obtained from this study were used as drug delivery carriers for naproxen etc. The release profiles of naproxen from the gel-drug matrix were studied carefully using UV-Vis spectroscopy. Different methods of preparing the gel with the model drugs were also studied and compared. In this presentation, the synthesis of these carbohydrate derivatives and their self-assembling properties will be discussed, followed by the studies of the hydrogelators as drug delivery systems. Finally, the progress on the study of covalently linked drug-gelator conjugates will be presented.

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