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## *Abbreviations*

CRS	Control release systems
3D	Three dimensional
PEG	Poly ethylene glycol
PTX	Paclitaxel
DOX	Doxorubicin
i.v	Intravenous
HEMA	Hydroxyl ethyl-meth acrylate
MBA	N,N'-methylene bis(acrylamide)
HA	Hyaluronan
CD	Cyclodextrin
CPT	Camptothecin
ATRP	Atom transfer radical polymerisation
RAFT	Reversible addition fragmentation transfer
CMC	Carboxymethyl cellulose
HEC	Hydroxyl ethyl cellulose
HCPT	Hydroxycamptothecin
TP	Tea polyphenols
G	Guanine
C	Cytosine
h	Hour
t	Time
T	Temperature

$^{\circ}\text{C}$  Degree Celcius

$\sigma$  Stress

$\varepsilon$  Strain

## *Preface*

Chemotherapy is the conventional mode of cancer treatment where the repeated doses of drugs are given to the patient, which impose severe side effects like nausea, hair fall, loss of appetite and liver damage. For most of the times the concentration of drug is either above the therapeutic level or below the required level. Fluctuations in drug concentration in blood stream results in adverse effects and treatment becomes expensive. To address these challenges controlled drug delivery devices came into existence where, there is efficient utilization of drug, desired extended duration, with very low chances of toxicity, facilitating enhanced complication of patient, leading to better management of therapeutics. The efficacious use of drug influences cost factor and economy of therapy too. In general the control drug release system is an entity that delivers the drug at specific site at predetermined rate for prolonged period of time. Polymers are widely used as drug carriers due to their versatile range of hydrophilic and hydrophobic components and their polymer-polymer, polymer-drug, and polymer solvent interactions. Their fabrication is done in such a way that they regulate the entry of drug within body and release them continuously in planned pattern for a particular duration of time, either systematically or to a targeted site. Materials required for control release system (CRS) must be biomaterial, among these are biocompatibility, processibility and sufficient mechanical strength. Polymer based drug delivery systems has enormous impact in therapies, where the drug is entrapped in the polymer matrix and then can be injected or implanted in the body. Both naturally occurring and synthetic polymers have been explored to design drug delivery systems, however naturally occurring biopolymers are preferred due to their inherent non toxic, biodegradable and biocompatibility and low cost.

Here in we have focused on the preparation of Cyclodextrin based drug delivery systems. Cyclodextrins are a group of cyclic oligosaccharides, containing six ( $\alpha$ -CD), seven ( $\beta$ -CD), eight ( $\gamma$ -CD), or more ( $\alpha$ -1,4-)-linked D-glucoopyranose units, consist of a relatively hydrophobic inner cavity and a hydrophilic outer face. Functionalization of exterior hydroxyl groups with hydrophobic components yielding different functionalized polymers. This thesis presents synthesis of different architectures with varying graft density and chain length through chemical modification of cyclodextrin/dextrin with polyurethanes, characterization and their application in controlled drug delivery. In this thesis graft copolymers with different degree of substitution and graft length have been prepared to obtain polymers with better thermal and mechanical properties as compared to pristine polymers. Due to grafting controlled drug release has been observed along with improved biocompatibility in developed copolymers. Further these polymeric architectures have been utilized in different formulation for cancer treatment.

This thesis has been bind up with following outlines: introduction and literature review, results and discussion, and conclusion. List of journals used to bind up this thesis has been given at the end of the thesis as references.