INTRODUCTION

Controlled drug delivery technology represents one of the frontier areas of science, which involves multidisciplinary scientific approach, contributing to human health care. These delivery systems offer numerous advantages compared to conventional dosage forms, which include improved efficacy, reduced toxicity, and improved patient compliance and convenience. Such systems often use macromolecules as carriers for the drugs. By doing so, treatments that would not otherwise be possible are now in conventional use. This field of pharmaceutical technology has grown and diversified rapidly in recent years. Understanding the derivation of the methods of controlled release and the range of new polymers can be a barrier to involvement from the non-specialist. Of the different dosage forms reported, microparticles and nanoparticles attained much importance, due to a tendency to accumulate in inflamed areas of the body. Nano and microparticles for their attractive properties occupy unique position in drug delivery technology. [Majeti N. V. Ravi Kumar et al., 2000]

Microparticles are defined as particulate dispersions or solid particles with a size in the range of 1-1000 μm. The drug is dissolved, entrapped, encapsulated or attached to a microparticle matrix. Depending upon the method of preparation, microparticles, microspheres or microcapsules can be obtained. Microcapsules are systems in which the drug is confined to a cavity surrounded by a unique polymer membrane, while microspheres are matrix systems in which the drug is physically and uniformly dispersed. In recent years, biodegradable polymeric microparticles, particularly those coated with hydrophilic polymer such as poly (ethylene glycol) (PEG) known as long-circulating particles, have been used as potential drug delivery devices because time target a particular organ, as carriers of their ability to circulate for a prolonged period time target a particular organ, as carriers of DNA in gene therapy, and their ability to deliver proteins, peptides and genes. [N.S. Dey et al., 2008]

Processes of preparing microspheres that enable control of well-defined particle characteristics such as size, size distribution, and functionality are becoming increasingly important for a variety of applications. However, either the particle size range that is achievable, or the types of materials that can be utilized in the process limit some of the current methods of microsphere preparation. The development of new methods for the preparation of microspheres that broaden the design space would therefore be an asset. [P. Burnset al., 2002]
Approaches to Prepare Microparticles Microspheres and Microcapsules

A wide range of microencapsulation techniques have been developed to date. The selection of the technique to release microspheres, the choice of the optimal method has utmost importance for the efficient entrapment of the active substance. Pharmaceutically acceptable microencapsulation techniques using hydrophobic biodegradable polymers such as poly(lactide-co-glycoside) and poly(lactic acid) as matrix materials are divided into four categories. 1. Emulsion–solvent evaporation (o/w, w/o, w/o/w) 2. Phase separation (nonsolvent addition of solvent partitioning) 3. Interfacial polymerization. 4. Spray drying [Juergen Siepmann et al., 2006]

Several methods and techniques are potentially useful for the preparation of polymeric microparticles in the broad field of microencapsulation. The preparation method determines the type and the size of microparticle and influence the ability of the interaction among the components used in microparticle formulations. Polymeric carriers being essentially multidisciplinary are commonly utilized in microparticle fabrication and they can be of an erodible or a non-erodible type. [Wasfy M. Obeida et., 2009]

Microparticles offer various significant advantages as drug delivery systems, including: (i) an effective protection of the encapsulated active agent against (e.g. enzymatic) degradation, (ii) the possibility to accurately control the release rate of the incorporated drug over periods of hours to months, and (iii) an easy administration (compared to alternative parenteral controlled release dosage forms, such as macro-sized implants). Desired, pre-programmed drug release profiles can be provided which match the therapeutic needs of the patient. This article gives an overview on the most important past, current and future strategies using drug-loaded microparticles to improve the efficiency of various medical treatments. Special emphasis is laid on the different types of preparation techniques that are commonly used, the physicochemical properties of the devices and practical examples illustrating the considerable benefits of this type of advanced drug delivery systems. But also the major challenges and obstacles to be overcome during the development and production of these pharmaceutical dosage forms are pointed out. [Juergen Siepmann et., 2006]

Microparticles are less dependent on gastric emptying, resulting in less inter and intra-subject variability in gastrointestinal transit time. They are also better distributed and less likely to cause local irritation. Recently much emphasis is being laid on the development of Sustained release microparticles dosage forms in preference to single unit systems because of their potential
benefits such as increased bioavailability, reduced risk of systemic toxicity, reduced risk of local irritation and predictable gastric emptying. Microparticles dosage forms are having utility in to mask the taste of bitter drugs, provide protection to the core material against atmospheric effects and reduces hygroscopicity. The mechanism of drug release from multiparticulates can be occur in the following ways: Diffusion on contact with aqueous fluids in the gastrointestinal tract (GIT), water diffuses into the interior of the particle. Drug dissolution occurs and the drug solutions diffuse across the release coat to the exterior. Erosion some coatings can be designed to erode gradually with time, thereby releasing the drug contained within the particle. Osmosis In allowing water to enter under the right circumstances, an osmotic pressure can be built up within the interior of the particle. The drug is forced out of the particle into the exterior through the coating. [Abhay N. Padalkar et al., 2010]

They were evaluated for morphology, melting point, size distribution, drug content and percentage drug entrapped, flow property, in-vitro drug release and comparative drug release studies with commercial dosage forms. J. Ravi Kumar Reddy [et al., 2009]

Administration of sustained release medication does not permit the prompt termination of therapy. Immediate changes in drug need during therapy, such as might be encountered of significant adverse effects are noted, cannot be accommodate. The physician has less flexibility in adjusting dosage regimens. This is fixed by the dosage form design. Sustained release forms are designed for the normal population that is one the basis of average drug biological half lives. Consequently, Disease states that alter drug disposing, significant patient variation and so forth are not accommodated. Economical factors must be assessed since more costly process and equipment are involved in manufacturing many sustained release forms. [Abhay N. Padalkar et al., 2010]

The market for drug delivery system has come a long way and will continue to grow at an impressive rate. Today’s drug delivery technologies enable the incorporation of drug molecules into a new delivery system, thus providing numerous therapeutic and commercial advantages. Microparticle drug delivery systems provide several all the advantages including greater flexibility and adaptability of microparticle dosage forms which gives clinicians and those engaged in product development powerful new tools to optimize therapy. It is little wonder therefore, that such systems are growing rapidly in popularity. [NS Day et al., 2008].