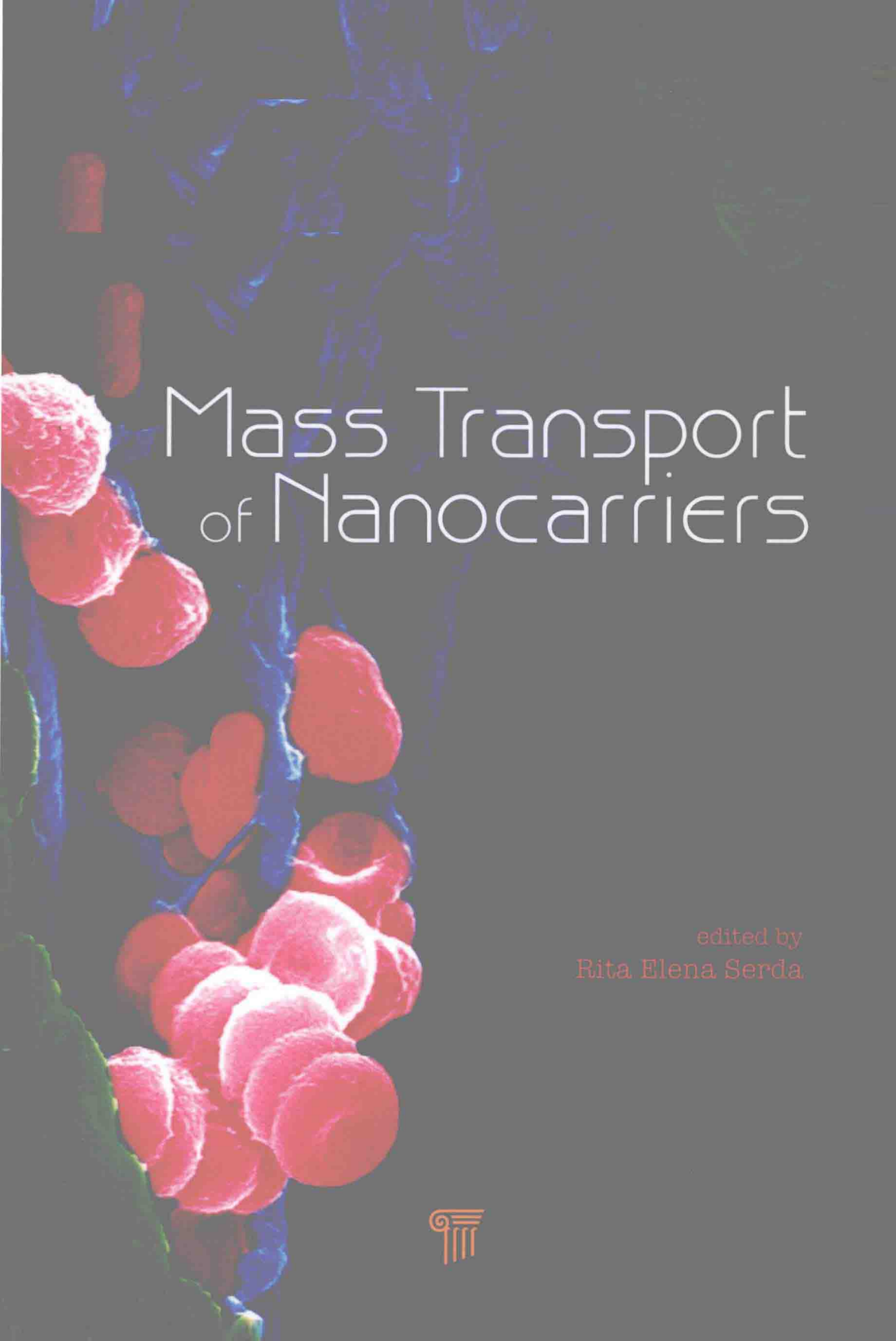

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edited by
Rita Elena Serda

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Preface

The journey of a nanocarrier from the site of entry to the site of action is filled with abundant sequential and concomitant obstacles, or barriers, designed to protect the host from foreign invaders. One of the major goals of nanomedicine research is the optimization of particle properties to achieve site-specific delivery of therapeutics to the target lesion(s). Nano- and microparticles possess intrinsic characteristics that influence their interactions with the surrounding milieu, which go beyond chemical composition, and include geometrical and chemical properties. These properties can be tailored to achieve particular tasks, creating nanoscale entities with macroscale capabilities.

Although barriers have a negative connotation in drug delivery, their unique traits within lesions can create opportunities for increased accumulation of therapeutics delivered through specially-designed carriers. For example, unique attributes of the tumor microenvironment, such as abnormal blood vessel morphology, vascular fenestrations, and unique vascular and cellular markers, or "zipcodes," can be used to enhance targeting by means of optimizing physical characteristics and surface chemistry of the particles. The route of administration dictates biobarriers encountered in route to the treatment site. Barriers exist from the macro- to the microscale, and this book explores barriers ranging from the level of endothelia, stroma, and mucosa to the level of cellular organelles. Cellular barriers include crossing the plasma membrane, escaping the endosome, and intracellular trafficking to the target organelle. The book also explores methods for nanocarrier fabrication and imaging techniques to track particles *in vitro* and *in vivo*. Several model types of nanocarriers and their biological applications are presented.

The majority of the authors who contributed to this book are researchers at the Texas Medical Center, with contributions from investigators at the University of Houston, the University of North Carolina, the University of New Mexico, and the University of Louisville. Each chapter is written by experts discussing their own research and providing an overview of the field.

Rita Elena Serda

Winter 2012

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