

MALDI-MS Applications in Glycomics of Glycosaminoglycans

By

Tatiana N. Laremore

An Abstract of a Thesis Submitted to the Graduate

Faculty of Rensselaer Polytechnic Institute

in Partial Fulfillment of the

Requirements for the degree of

DOCTOR OF PHILOSOPHY

Major Subject: Chemistry

The original of the complete thesis is on file
in the Rensselaer Polytechnic Institute Library

Examining Committee:

Robert J. Linhardt, Thesis Adviser

Curtis M. Breneman, Member

Wilfredo Colón, Member

Jane F. Koretz, Member

Rensselaer Polytechnic Institute
Troy, New York

August, 2007

ABSTRACT

Matrix-assisted laser desorption/ionization mass spectrometric (MALDI-MS) analysis of highly acidic, thermally labile species such as glycosaminoglycan-derived oligosaccharides is complicated by their poor ionization efficiency and tendency to fragment through the loss of sulfo groups. Under conventionally used MALDI-MS experimental conditions, uncomplexed polysulfated oligosaccharides do not produce any signal. Ionic liquid matrices (ILMs) permit sensitive detection of the sodium salts of the chondroitin sulfate and dermatan sulfate oligosaccharides up to a decasaccharide and an octasulfated heparin-derived pentasaccharide. A significant improvement in the quality of mass spectral information is achieved using cesium salts of polysulfated oligosaccharides. Experimental results demonstrate that the fragmentation through the loss of SO_3 in the cesium salts of highly acidic oligosaccharides is suppressed.