

Biomaterials Research and Development at Missouri S&T

Mohamed N. Rahaman

Professor of Materials Science and Engineering

Director, Center for Bone and Tissue Repair and Regeneration

Missouri University of Science and Engineering

Biomaterials are critically important to future developments in the life sciences. They provide a backbone for biomedical research in academia and industry, and are a key component of reconstructive medical and dental research as well as patient and animal care. The worldwide demand for biomaterials for use as biological substitutes to restore and improve tissue function, currently estimated at \$40 billion, is expected to grow substantially (10–20% per year) with future advances and an aging population.

A major area of emphasis for future biomedical research is the development of new, more advanced biomaterials to replace hard and soft tissues, lost because of age-related attrition or degeneration, disease, or trauma. Although existing biomaterials and reconstructive procedures have improved the quality of life for many patients, the clinical performance and longevity of prosthetic replacements is considerably lower than that of the original tissue. The promising field of tissue engineering has the potential for overcoming many of the limitations of existing materials and procedures. The success of tissue engineering will, to a large extent, depend on biomaterials and the understanding of their biological interactions with molecules, cells, tissues, and organs.

This presentation will provide an overview of the biomaterials research and development efforts in the Center for Bone and Tissue Repair and

Regeneration (CBTRR) at Missouri S&T. Areas such as bioactive glass for hard (bone) and soft tissue repair, hydroxyapatite and bioactive glass microspheres for drug delivery, orthopaedic biomaterials, and advanced techniques for fabricating biomaterials with the requisite anatomical shape and structure, will be covered. Ongoing research collaborations in biomaterials and tissue engineering with the University of Missouri campuses at Kansas City and Columbia will be described. Potential economic and health benefits that could result from expansion of these collaborative research efforts among the University of Missouri campuses will be discussed.