Development and Characterization of a Novel Orthopaedic Bearing Surface Material

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Project Description
The use of ultra high molecular weight polyethylene (UHMWPE) inserts in total joint replacements (TJR), including total knee replacements (see Fig. 1), results in wear particle-caused osteolysis, the predominant cause for prosthesis failure and revision surgery. UHMWPE particle generation is inevitable despite the numerous efforts in improving this material. This project seeks to further develop and modify an enriched UHMWPE material (patent pending) that will serve as a drug delivery device to mitigate osteolysis. Students performing this research will compression mold, test and characterize modified polymers.

Student Duties
1. Conduct relevant literature reviews.
2. Mix and compression mold polymer.
3. Perform & analyze results from tensile testing and pin-on-disk wear experiments.
5. Keep the research lab clean and organized.
6. Actively participate in biweekly group meetings and write summary reports.

Student Qualifications
1. This research is open to 1st year students through senior.
2. Time requirement: minimum of 10 hours/week
3. Minimum two consecutive quarters of work.

Project Timeframe/Plan
Project to begin either Winter or Spring quarter. Students interested in summer research should also apply. Time frame for this project is one year. However, upon successful completion of the proposed project, it will be extended to perform biological testing of the new materials. Performance will be evaluated throughout the project.

Outcomes
Students will be actively involved in cutting edge orthopaedic research (patent pending on the material they will be modifying). Students will learn how to (1) perform polymer characterization, (2) conduct literature reviews and interpret data from other research, (3) become familiar with writing peer-reviewed research article for publication.