DREXEL UNIVERSITY
Materials Science and Engineering
College of Engineering

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING
PhD Thesis Proposal

TUESDAY, APRIL 7TH, 2020 AT 11:00 AM
ONLINE ONLY: WEBEX MEETING

INVESTIGATION INTO THE POWDER ADHESION PHENOMENON DURING THE TABLET COMPACTION OF MIXTURES

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The pharmaceutical tablet is the most common dosage form that is currently used to market medicines. Tablets are typically multicomponent mixtures consisting of the active drug and various excipients that serve specific purposes. A tablet is typically formed by compressing powder in a metal die and with metal punches. However, tablet formation is often met with various challenges that affect its integrity and performance. One of such challenges is the occurrence of a specific type of defect that is loosely termed as 'Sticking'. The term 'Sticking' refers to a phenomenon that results in the adherence of materials onto the punch faces and die wall even after the metal tooling has left contact with the tablet. The occurrence of sticking during large scale tablet manufacture can produce defective tablets, halt manufacturing operations, delay clinical studies, delay delivery of critical medicines to patients, and can be very costly.

Currently, the mechanisms by which this phenomenon occurs are not clearly understood. Numerous factors dealing with powder characteristics and instrumentation parameters are reported in literature to affect sticking. Therefore, sticking is a complex multifaceted phenomenon in which multiple factors can simultaneously contribute to the issue. The goal of this proposal is to study the mechanisms by which sticking occurs and to develop sensors to measure and characterize the phenomenon. The proposed work will explore material related effects of excipients, particle size, hardness, percolation and tablet press related effects of compaction speed and the conditioning of punch surfaces. Outcomes of the proposed work will help to bridge gaps on the mechanistic understanding of sticking and will enable scientists to evaluate and engineer powder blends that will minimize or eliminate its occurrence during tablet manufacturing operations.