EXECUTIVE SUMMARY: *(State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project for California.)*

Cell migration is important to the proper functioning of cells as it affects various mechanisms such as cell differentiation, tissue organization, formation of embryos, formation of organs, wound repair, and tumor formation. The movement of cells is known to be induced by chemical gradient that exists in the environment, a phenomenon known as chemotaxis. Specialized proteins (receptors) on a cell membrane are able to recognize certain external stimuli, such as chemical molecules, and use that to trigger a cascade of biochemical events within the cell, which eventually leads to the formation of special structures called lamellipodia and filopodia at the front or leading edge of a cell. The lamellipodia are sheet-like protrusions on cell edge that drive cell movement and provide the traction to anchor a moving cell, while filopodia are fiber-like protrusions on cell edge that gather information from a surface and guide the moving cell. Together with an anchoring protein known as focal adhesion that is found at the interface of a cell membrane and a synthetic surface, lamellipodia and filopodia are responsible for cell motility. In this research, we propose to study the effect of nanometer, cylindrical structures known as nanowires that are made of zinc oxide on the formation of lamellipodia, filopodia, and focal adhesions. Understanding such an effect would allow us to rationally utilize surface topography, instead of proteins, as a tool to control cell migration, which would have significant impact on tissue organization, wound repair, and tumor formation. The long-range goal of the proposed research is to understand and control cell migration on synthetic solid surfaces so as to better engineer implant materials that enhance biocompatibility and wound repair.