

Example Student Training Plan

Training Philosophy: The objectives of student training in Dr. xxx's laboratory are to *expose students to biomedically related research, to motivate them toward a biomedical research career, and to accomplish a meaningful research project.* To achieve these objectives, we have and will continue to provide the following support for BUILD students:

Selection and assignment of a research project: When a new BUILD student joins the laboratory, Dr. xxx will personally explain to him/her our research focus, and our ongoing research projects in the laboratory. The student will then be assigned a research project compatible to his/her own interests but consistent with the capability and goal of funded research projects in our lab.

Description of Proposed Research Training Projects in Dr. xxxx's Research Laboratory:

Research Interests in Electroanalysis: One of our research interests is the development of electrochemical sensors and biosensors for biologically important molecules. In particular, we have developed sensitive electrochemical sensors for hormone insulin and new amperometric biosensors based on the immobilized oxidase enzymes for glucose, lactate, and glutamate. We are currently working on the synthesis and characterization of new electrochemical sensing platforms based on systems that include dehydrogenase enzymes, polymers, and carbon nanotubes. Our long-term goal is to design selective sensing systems and integrate them into electrochemical devices in order to demonstrate new concepts leading to useful applications for medical and environmental diagnostics.

Research Interest in Electrocatalysis: Another aspect of our research involves the preparation and characterization of inorganic catalytic surfaces for the development of a variety of electrochemical devices such as sensors, biosensors, biological fuel cells, and clean chemical reactors. Our focus is on the design of multicomponent inorganic systems displaying synergistic effects. The recent examples of such systems include catalytic surfaces based on transition/post-transition mixed metal oxides. Such surfaces displayed, for the first time, enhanced catalytic activity toward the electrooxidation of selected carbohydrates at physiological pH (7.40). This was ascribed to synergism that involved retention of carbohydrate molecules at post-transition metal centers and oxidation at the adjacent transition metal centers. Our long-term goal is to develop a family of new electrocatalysts and use them to probe the redox chemistry of selected biomolecules.

Monitoring of student activity and research progress: The students will present their research progress at weekly group meetings. In addition, Dr. xxx has and will continue to designate office hours (1/2 to 1 hr per week) to meet individually with each BUILD student to discuss his/her research directions and research progress. One full-time research scientist associate who serves as a manager of the overall laboratory operations assists Dr. xxx.

Research techniques/Methods: Examples of research techniques available for student training include cyclic voltammetry, amperometry, rotating disk electrode, electrochemical impedance, potential pulse techniques, UV-visible spectroscopy, FTIR, thermogravimetric methods, chromatographic separations, preparation of thin films, etc.

Presentation and Publication of Research Results: Depending on the duration of training period in the laboratory, BUILD students are required to present their research at national meetings and publish their results in refereed publications. A list of presentations and a list of referred publications with student co-authors are provided in Section X.