Independent Study at Smart Interfaces in Environmental Engineering (SIEN)

Estimating Surface Adsorption Kinetics of Lubricant additives

At SIEN, we study novel additives (surface-adsorbing molecules) that will be employed in lubricant formulation to reduce friction and wear between the moving parts in an Engine. Such additives will assist in improving the efficiency of an automobile and as well reduce the amount of poisonous exhaust emissions into the environment. These additives, however, should display two important characteristics for them to be considered as good candidates for formulation: (1) high surface interaction with engine material such as stainless steel, for example (2) high solubility in the base-oil. The *specific aims* of the project are to estimate the solubility of the additives in the base-oil and further estimate the surface adsorption kinetics of the additives in base oil with the help of Quartz Crystal Microbalance (QCM). This project is an excellent opportunity in gaining experience with working in a lab dedicated to surface science and nanotechnology research. A Postdoc will directly supervise the student, although, student's ability to be self-directed and independent is crucial.

The student will be involved in:
- Preparing solutions/formulations with different concentrations of additives and estimate the solubility of the solutions.
- Operating Quartz Crystal Microbalance to estimate adsorption behavior of additive molecules.
- Analysis of experimental data.

Preferred background:
Preferable for students with a past experience in wet-lab chemistry. Experience in Quartz Crystal Microbalance will be an added advantage but not necessary. Grades will be taken into account.

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