Postdoc fellowship at Yale in Microbial Electron Transfer via Conductive Proteins

Rudolf J. Anderson postdoc fellowship is immediately available in the laboratory of Prof. Nikhil Malvankar in the Molecular Biophysics & Biochemistry Department and interdisciplinary Microbial Sciences Institute, the first of its kind, at the Yale University’s new West Campus.

The overarching goal of our lab is to define the mechanisms by which microbes interact with and manipulate their environment, with the ultimate goal of engineering these interactions to control microbial pathophysiology and ecology. The project is focused on how microbes use electron transfer via hair-like protein appendages called pili for communication, survival and biofilm formation. We have found out that common soil bacteria Geobacter use pili as “nanowires” with metallic-like conductivity for respiration (Nature Nano 2011) and to share energy (Science 2010). We have also developed a new charge imaging technique to visualize bacterial electron transfer via pili and cytochrome proteins (Nature Nano 2014). This field has seen a recent explosion of interest as a diversity of microbial species have been found to transfer electrons via pili and cytochromes (e.g. 4 articles in Nature 526 (2015) pg. 513, 531, 587, and Nature (2016).

The candidate will work on one or more of the following four major research themes of our lab:

1) **Protein Structure**: We are identifying structural and molecular basis of electron transfer in conductive pili, building on our preliminary experimental and computational work suggesting closely packed aromatic amino acids in pili confer π-stacking and conductivity (mBio 2015).

2) **Electronic Structure**: We are elucidating the biochemical and biophysical mechanism of electron transfer in pili by applying various electrochemical and spectroscopic methods.

3) **Conductivity Mechanism**: Existing models of biological electron transfer cannot fully explain such high conductivity in proteins. We are building a new fundamental framework by performing conductivity measurements as a function of several physical and chemical probes.

4) **Host-pathogen Interaction**: We are developing a new class of anti-microbial therapies by targeting microbial survival mechanisms during pili-mediated common bacterial infections.

We are looking for candidates with expertise in one of the following: site-directed mutagenesis, electron transfer in proteins or conducting polymers, membrane protein purification; cultivation of BSL2 level bacterial pathogens and their mammalian host cells. This experimental position also presents extensive collaborative opportunities with computational and clinical scientists.

For more information visit [http://campuspress.yale.edu/malvankarlab/](http://campuspress.yale.edu/malvankarlab/)

The candidate is expected to have a PhD degree or equivalent. Our research is multidisciplinary and we encourage candidates from different backgrounds. Applicants should be highly self-motivated and have potential to become independent researchers in academia or industry.

Candidates should send an email to [postdoc@malvankarlab.org](mailto:postdoc@malvankarlab.org) with the following materials (submitted as one combined PDF file):

1. A cover letter (no longer than 2 pages) describing your past and present research projects as they relate to above research in our lab and your career goals.
2. A document (no longer than 1 page) describing how you plan to contribute to our lab.
3. CV.
4. Contact of 3 references, including phone and email. Describe your connection with them.