



International Doctoral Program in Science Fellowship

Investigating vectorial protein transport through nanopores

Background and motivation

Understanding how proteins fold is the key to addressing neurodegenerative diseases such as Alzheimer's and Parkinson's disease. Most of what we know today regarding this problem stems from experiments that use short model proteins that reproducibly fold to a global minimum. This is *not* representative of how real proteins behave since they are much larger and can begin folding anywhere along their length. Our research thus seeks to overturn conventional wisdom on protein folding by conducting optical studies of *single* proteins that fold during what is called vectorial transport. This is more representative of how actual proteins fold. The technique we are pursuing involves fluorescence resonance energy transfer (FRET) measurements where individual proteins have been labeled with donor and acceptor molecules. The proteins are then passed through a nanopore followed by single molecule optical microscopy observations of subsequent folding. This work combines single molecule optical microscopy along with modern protein synthesis and functionalization.

Profile

- Master's degree or similar qualification in Physics, Materials Science, Chemistry or adjacent fields.
- A solid background in physics, materials science or materials chemistry is required.
- The candidate will be expected to interface with biochemists and should be able to cross disciplinary boundaries. Hence a strong interest for multidisciplinary research is required.
- Experience in optical microscopy and solution phase chemical synthesis will be considered as an advantage.
- Good knowledge of the English language, both spoken and written, is essential.
- Strong commitment, ability to work in a team, and eager for international mobility is desired.

Opportunities

- Experimental research participating to the international collaboration between research groups USA and Italy. **Double degree opportunity. The position is available immediately. Student stipend at the University of Notre Dame is currently \$30,448 before tax. Health insurance is provided at no cost.**

Supervisors

Prof. Masaru Kuno, University of Notre Dame (U.S.A)

Prof. Patricia Clarck, University of Notre Dame (U.S.A)

Prof. Luca Gavioli, Università Cattolica del Sacro Cuore (Italy)

Info

Contact us for further details and questions

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