



SCHOOL OF BIOLOGICAL
SCIENCES

Cell Biology and Biophysics

November 14, 2003

Faculty Search Committee
c/o Professor James Glazier
Department of Physics
University of Indiana
Swain Hall West 117
Bloomington, IN 47405-7105

RE: Dr. Liviu Movileanu, Ph.D.

Dear Professor Glazier:

I am writing this letter in support of the application of Dr. Liviu Movileanu for a faculty position in your department. I first met Dr. Movileanu in 1997 when he accepted a postdoctoral position in the laboratory of Dr. George Thomas, Jr. at the University of Missouri-Kansas City. I am a long time colleague of Professor Thomas and hold the position of Research Assistant Professor in the School of Biological Sciences at UMKC. I was the direct supervisor of Dr. Molveanu during his time in the Thomas' lab and therefore I am very familiar with his research and most recent accomplishments. My own fields of expertise are in the areas of molecular recognition and Raman spectroscopy. Over the past two decades my research has focused on the processes of molecular recognition and macromolecular assembly with emphasis on proteins and nucleic acids.

Dr. Movileanu joined our research group in late 1997. Although he had limited experience in molecular spectroscopy at that time, he immediately immersed himself in the subject area. He exhibited a determination and dedication to research that I have all too rarely seen in a young investigator. His research here focused on DNA structure and dynamics and the application of Raman spectroscopy as a probe of premelting and melting transitions in AT-containing duplex DNA. We were particularly interested in understanding the molecular basis of the premelting transition and exploring the structural dissimilarities of alternating (AT/TA) and non-alternating sequences (AA/TT). Dr. Movileanu proposed that fundamental differences in the number and arrangement of hydrogen bonded water molecules is a key to understanding differences in premelting behavior and the thermodynamic properties exhibited by alternating and non-alternating sequences. One of Dr. Movileanu's most important contributions to the project was the development and refinement of methodologies for extracting thermodynamic parameters from Raman melting profiles. Remarkably, in only one year Dr. Movileanu's research led to three peer-reviewed papers.

Although I am most comfortable commenting on Dr. Movileanu's accomplishments while a member of the Thomas' laboratory, I have kept abreast of most his work during his time at Texas A&M. There he has had a major impact in the relatively new and exciting field of studies at the single-molecule level. Dr. Movileanu has constructed and investigated the properties of a genetically engineered protein pore in which a single polyethylene glycol chain is attached at a defined site within the pore lumen. This engineered pore has a wide range of applications in the emerging nanotechnology arena. His achievements are a real *tour-de-force* in the physical chemistry of highly flexible polymer chains.

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The importance of this paper to the field merited special recognition in *Science* (*Science* 287:18-19, 2000). The recognition that Dr. Movileanu's paper received underscores the impact that his research has had in the field.

The research on engineered protein pores has been extended by using a functionalized tethered polymer in the central cavity. The untethered end of the polymer can covalently attach to and trap a ligand on either side of the membrane, in essence functioning as a simple "angling rod" to pull the ligand from one side of the membrane to the other. This represents one of Dr. Movileanu's most noteworthy contributions to the biosensor field. His approach is not limited to the sensing of large protein molecules, but can be adapted to other biologically important polymers at the single-molecule level such as oligosaccharides, peptides and polynucleotides. This work was published in *Nature Biotechnology* (18:1091-1095, 2000). The paper was considered a landmark publication and received special attention in a "News and Views" article in the same issue of the journal. The paper was also reviewed in the online journal *DoubleTwist* by Dr. Jim Kling, where he praised the great advantage of the method using single-channel measurements.

Very recently Dr. Movileanu has devised a new approach to detect the existence of constrictions that may occur along the lumen of the pore. This procedure is particularly important for transmembrane pores where no 3-D structure currently exists. In anticipation of the impact that this work would have in the field, the editor of the journal selected the paper for a **special commentary** by professor A. Karlin of Columbia University. Dr. Karlin, a distinguished member of the National Academy, praised the idea of using unusually large sulfhydryl-directed reagents to probe the narrowest regions of large protein channels.

Dr. Movileanu has also applied his knowledge on DNA structure and dynamics obtained in our laboratory to develop a method for sequence-dependent sensing of oligonucleotides at the single-molecule level. He also explored the kinetics of the formation of duplex DNA by single DNA strands, also at the single molecule level. This research resulted in two publications in *PNAS*.

From the above discourse, I hope that I have convinced you that Dr. Movileanu is a very talented and dedicated researcher. He was a friendly and considerate colleague as well, a person who was truly enjoyable to work with. In conclusion, I strongly support Dr. Movileanu's application for a faculty position in your department. Please do not hesitate to contact me if I can be of further assistance.

Sincerely,



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