CFM
Centro de Física de Materiales
Materials Physics Center
Materialen Fisika Zentroa

Department of Homeland Security
U. S. Citizenship and Immigration Services

San Sebastian, June 4, 2014

Reference: Dr. Clement Riedel's I-140 Immigrant Petition for an Alien of Extraordinary Ability (EB1A)

TO WHOM IT MAY CONCERN

Dear Sir/Madam:

It is my pleasure to support Dr. Clement Riedel's petition for immigration to the United States. I am writing to provide evidence that his research and development work is exceptional and he has Extraordinary Ability (EB1A) in research.

I am professor of Condensed Matter Physics at the University of the Basque Country and coordinator of the Research Line Polymers & Soft Matter of the Materials Physics Center (MPC), a joint center between the University of the Basque Country and the Spanish National Research Council (CSIC). I am also the Vice President of the Donostia International Physics Center (DIPC). I have published over 350 scientific articles and given over 60 lectures at international conferences, co-authored one book and co-edited another two. I have received, among other distinctions: Xabier de Munibe Award (1998); Euskadi Science and Technology Research Award (2000), and the Spanish Royal Society of Physics Medal (2003). During my career I have directly supervised 15 Phd thesis including Clement's from October 2007 to October 2011. The DIPC has a strong research reputation and I had the chance to supervise extremely high quality PhD students. It is my professional opinion that Clement is not only above the average but he stands as one of the very best scientists that I know.

Clement has an extremely strong scientific background. During his License in Physics, he obtained the Janus award. He then performed outstanding studies and research while graduating his Master degree in High Energy Astrophysics. During the first year he computed the sensitivity of FERMI, a NASA' satellite to dark matter while during the second year he went to Armenia and study electromagnetic air showers created by astrophysical objects such as supernovae or black holes. Looking at the excellence of his research I chose to fund and supervise him during his PhD. I am now going to describe the research that he performed and detail how, in many aspects, it can be qualified as outstanding.

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The first topic that Clement's covered was the study of dielectric and mechanical properties of polymers at the macroscopic scale. Clement developed impressive experimental skills by mastering Broadband Dielectric Spectroscopy and Rheology, two techniques that permit to measure dielectric and mechanical properties, respectively. He invented a novel experiment where he measured both properties at the same time. He then analyzed the results of this coupled experiments to show that both behaviors could be described using a unique theory (Rouse theory). He then pursued his research by showing that effects of entanglements are observed for long macromolecular chains. It is worthy of remark that macromolecular chain dynamics dictate the viscoelastic properties of melts of polymer systems and thereby the industrial polymer processing among many different technological applications of polymer materials. Clement published this part of his research, as the first author, in Macromolecules and Rheologica Acta, reference journals in the field. Being part of several networks, I can attest that these results have largely spread to the community and is highly significant. Independent researchers directly reported to me their interest for the research performed by Clement, asking for raw data and details on both experiments and analysis. As a result, these results have been cited 12 times, independently.

The second part of Clement's research was focused on the study of dielectric properties at the nanoscale using an Atomic Force Microscope (AFM). Clement's realized this part of his research between four laboratory in Spain (DIPC and Mole group in Madrid), France (South Institute of Electronics) and USA (Israelof Lab, Northeastern University). He created a network of excellence between these laboratories with transfer of knowledge, skills, people, samples...

When Clement started his Phd, my laboratory was leading research in macroscopic polymer science but had no previous knowledge concerning AFM. On the other side, the South Institute of Electronics had knowledge in AFM. Clement quickly learn this experimental technique. Above implementing it in my laboratory, he used it in the electrostatic mode and developed a method to measure dielectric properties, in one spatial point, at the nanoscale. Having published more than 350 articles and being aware of thousands of scientific contributions, I state that this research stands as a rare fundamental breakthrough that had and will lead to other incremental discoveries. The first incremental discovery was the ability to perform dielectric map of heterogeneous polymer at the nanoscale. Above basic knowledge, these maps are crucial for applied fields including electronics or computing where wires (that would transport electricity and information) needs to be isolated at smaller and smaller scale.

Using the same experimental technique (AFM), Assistant Prof. Nathan Israelof (Northeastern University) developed a method to measure the frequency dependence of soft matter in one spatial point. In the frame of a collaboration, Clement visited Isreaelof Lab in Northeastern University and adapted the mapping method to obtain temperature-frequency dependent map of dielectric relaxation at the nanoscale. The scientific result itself is of crucial importance. Clement not only

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imported this new technique to the USA he assured the transfer of technology back to Europe. If the scientific output is the same, the fact that different AFM are used in different laboratories implies technical and scientific obstacles. Without getting into details, the system in Northeastern University worked in the Frequency Modulation mode under ultra high vacuum while the ones in Europe are in the Amplitude Modulation mode and ambient conditions. Clement correctly adapted both the experimental procedure and data analysis to obtain the same final results. Finally he assured to transfer this knowledge to other persons in the laboratory before leaving so that this technique is still used to perform new cutting edge research.

The last topics of Clement's research that I would like to underline is the simulation that he then performed while working at the University of Madrid with Prof. Saenz. During the last year of its contract with the DIPC, Clement chose to axe his research toward simulation and propose to visit Prof. Saenz for a period of 9 months. During this time, he coded (using Matalb) several simulations that correctly describe the interaction between an AFM and a dielectric sample. This led to several crucial understandings of physcical parameters such as the lateral resolution, penetration of the electric field and the possible use of AFM as a tomographic technique (i.e. a technique that would permit to measure properties under the surface of a sample).

Looking at its past research, the impressive number of publication Clement obtained as first author, the number of citations, it is clear to me that Clement qualified as an individual with Extraordinary Ability. Thanks to the high quality of the research performed in my laboratory few of the very best scientists from the DIPC obtained a position at the University of California in Berkeley (UC Berkeley), as Clement did. UC Berkeley in general and the Bustamante Lab (that Clement joined) in particular are part of the best environment to perform research in physical and biological properties at the nanoscale. In this context I have no doubt that Clement will keep performing outstanding research that will be beneficial for the USA. I therefore fully support his application and advise the USCIS officer reviewing this petition to grant Dr. Clement Riedel permanent residency in the United States.

Sincerely yours

Juan Colmenero

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