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May 13, 2012

To Whom It May Concern:

It is a pleasure to provide an evaluation of a Habilitation thesis by Dr. Adam Dubroka entitled "Probing high-temperature superconductivity and the two-dimensional electron gas at the LaAlO3/SrTiO3 interface with infrared spectroscopy". In short, the results summarized in this thesis are of superb experimental quality. I am impressed both by the scope of the work spanning a whole range of most interesting topics in the contemporary condensed matter physics and also by the depth of the insights reported by Dr. Dubroka. I can attest that the level of accomplishments documented in this thesis would be sufficient to secure a tenured faculty position within in some of the top research universities in the United States.

Dr. Dubroka has made many fundamental contributions to the understanding of the optical properties of diverse condensed matter systems including but not limited to: multi-layers and interfaces of complex oxides, cuprate and iron-arsenide high-Tc superconductors. Many of these results were enabled by the development of ellipsometric techniques that he has employed in his work. Ellipsometry in far infrared spectral region is one of the most complex if not the most complex spectroscopic experiment. Dr. Dubroka has mastered this method and has made a number of important advances in the data analysis. Some of these developments are addressed in Chapter 1 of his thesis.

Chapter 3 is dedicated to ellipsometric studies of the two-dimensional electron gas at the interface of two insulating substances LaAsO3 and SrTiO3. Ellipsometric experiments have provided a panoramic view of the electronic phenomena of subtle interfacial carriers including information on carrier density and processes responsible for frequency dependence of the electronic mobility. It is virtually impossible to obtain these insights from transport measurements alone. However, the main discovery reported in this work pertains to accurate evaluation of the thickness of the conducting layer at the interface. This is a highly non-trivial task and no other research group has been able to accomplish this before Dr. Dubroka. His solution to the problem is very elegant! He proposed to analyze the so-called Berreman lattice mode. An in-depth analysis of this effect is presented in the Chapter 2 of the thesis. Dr. Dubroka has been able to show that the thickness of the conducting layer does not exceed 2 nanometers. This finding has helped to resolve a number of controversies in the field. His article on this topic has been published in *Physical Review Letters* in 2010.

Chapter 4 of the thesis is dedicated to studies of the pseudogap phenomena in the high-Tc cuprates as well as to the analysis of the fempto-second dynamics of a prototypical cuprate high-Tc superconductor YBa2Cu3O7. The latter work unraveled the importance of the electron-phonon interaction in ultrafast dynamics of this cuprate. A "by-product" of this work is the development of experimental approaches to explore the phonon occupation on a sub-cycle temporal scale. This pioneering work was published in *Physical Review Letters* in 2010. Another breakthrough result reported by Dr. Dubroka pertains to the observation of spectroscopic signatures of interlayer Josephson