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Formation of Temporary Negative Ions and Their Subsequent Fragmentation upon Electron Attachment to CoQ_0 and CoQ_0H_2


Dr. J. Ameixa


Dr. E. Arthur-Baidoo


J. Pereira-da-Silva


J. C. Ruivo


Prof. Dr. M. T. do N. Varella


Prof. Dr. M. K. Beyer


Prof. Dr. M. Ončák


Prof. Dr. F. Ferreira da Silva


Prof. Dr. S. Denifl

The front cover artwork is provided by Prof. Stephan Denifl's group at the University of Innsbruck, Austria, in collaboration with Prof. Filipe Ferreira da Silva's group at NOVA University Lisbon, Portugal, and Prof. Dr. Márcio Varella's group at University of São Paulo, Brazil, as well as with Prof. Dr. Martin Beyer and Prof. Dr. Milan Ončak also at the University of Innsbruck, Austria. The image shows the main fragmentation pathways of both coenzyme Q_0 (CoQ_0) and CoQ_0H_2 upon electron attachment in the gas phase. Read the full text of the Research Article at 10.1002/cphc.202100834.

What prompted you to investigate this topic/problem?

ATP gives us all the energy to carry on our lives. It is mainly produced in the inner mitochondrial membrane, where ubiquinone (aka coenzyme Q_{10}) and CytC shuttle electrons between four protein complexes, which in turn create the energy to drive the ATP synthase enzyme. This idea, that our energy comes somewhat from electron attachment by single molecules gives the motivation to understand which processes, e.g., the formation of temporary negative ions, are behind the unique electron carrier properties of ubiquinone.

What was the inspiration for this cover design?

Sci-fi movies, where starships or even entire planets are destroyed by colorful beams somewhere in distant galaxies. In a crossed electron-molecular beam experiment, an electron gun shoots a beam of energetic electrons towards isolated molecules. Eventually, a molecule attaches one of the electrons with a specific kinetic energy to form a temporary anion, which often breaks apart into fragment anions and neutral species. Lying above a molecular constellation the electron-induced "destruction" of both CoQ_0 and CoQ_0H_2 is illustrated. Electrons are blue, right?

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