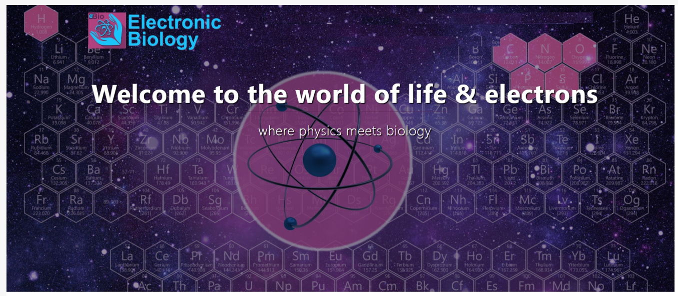
Electron-Ion Interaction Potential (EIIP): Bridging the Gap Between Living and Nonliving Systems

GALVESTON, TEXAS, USA, March 10, 2023 /EINPresswire.com/ -- The General Model Pseudopotential (GMP), also known as the Veljkovic-Slavic pseudopotential or EIIP, is a unique physical parameter that is determined solely by the atomic numbers of the elements. It is based on the idea of pseudopotentials, which are effective potentials that capture the essential physics of the electron-ion interaction while simplifying the problem by reducing the number of electrons that need to be considered. While calculation of EIIP is a relatively simple compared to more sophisticated quantum mechanical approaches, it has been found to be accurate and effective in predicting the properties of materials and systems in a wide range of conditions. EIIP is a powerful tool for investigating the fundamental properties of living and nonliving systems.



Electronic biology - new dimension of biology

In solid-state physics, EIIP is used to investigate various phenomena such as phonon spectra, electronic band structure, electronic conductivity, and superconductivity. It provides a simple and quantitative measure of the electronic properties of a material, which allows researchers to compare the electronic properties of different materials and to predict how they will interact with other molecules or environments.

In biological systems, EIIP has been used to study the electronic properties of DNA and proteins, and their interactions with other molecules. It has been shown that the EIIP values of nucleotides in DNA/RNA are related to their sequence-specific recognition by proteins. Similarly, in proteins, the EIIP values of amino acids have been used to predict protein-protein interactions, protein-

DNA/RNA interactions, assessment of biological effects of mutations and the design of artificial proteins with desired biological functions.

EIIP plays an important role in the determination of long-range biomolecular interactions, which are interactions that occur over distances of 10 to 1000 angstroms. These interactions are essential for the formation of biomolecular condensates, which are non-membrane-bound compartments that play important roles in the regulation of cellular processes.

In the context of the origin of life, long-range molecular interactions may have played a crucial role in the formation of the first cells. The building blocks of life, such as amino acids and nucleotides, are believed to have formed spontaneously in the early Earth environment. However, in order for these building blocks to assemble into larger structures, long-range interactions were necessary. It has been suggested that electrodynamic interactions, which are dependent on EIIP, played an important role in the assembly of the building blocks of life into larger structures.
Overall, the role of long-range molecular interactions in the origin of life is an area of active research and debate. However, it is clear that EIIP, as a fundamental physical parameter that connects living and nonliving systems, has the potential to shed light on the fundamental properties of matter and to provide insights into the emergence of life on Earth.

One of the key advantages of EIIP is its ability to provide a common language for describing the electronic properties of materials and molecules, regardless of whether they are living or nonliving. This has important implications for understanding the fundamental properties of matter and for developing new materials and technologies that can benefit both living and nonliving systems.

Overall, EIIP is a unique physical parameter that connects living and nonliving systems and allows for the study of their fundamental properties. It provides a simple and quantitative measure of the electronic properties of materials and molecules and has important implications for a wide range of fields, including materials science, drug discovery, biomedicine and biophysics.

EIIP is an important molecular descriptor for Electronic Biology and has been used successfully in a variety of applications related to drug design and the study of biological activity. For more information on EIIP and its applications, please visit http://electronicbiology.org/.

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