

Aquaphotomics

Roumiana Tsenkova

rtsen@kobe-u.ac.jp, Kobe University, Japan

Aquaphotomics (“all about water – light interaction”) is a new term, introduced to describe an area of science dedicated to enhance our understanding of water-light interaction at every frequency of the electromagnetic spectrum. In particular, VIS/NIR spectroscopy is considered as a new tool for water observation that provides immense information about water at molecular level and therefore, a better understanding of biological world. Water, as a natural biological matrix containing small molecules with a strong potential for hydrogen bonding, changes its absorbance pattern every time it adapts to physical or chemical change in biological systems or the environment. Therefore, its spectral changes permit measurement of small quantities or of structural changes in other molecules in the system, too. In other words, NIR light adds a new dimension to the water mirror effect caused by the visible light reflection from the surface of the water. Water becomes a “stereo, 3D” mirror on molecular level as, in addition to the reflection of the visible light from its surface, every frequency of the NIR light penetrates into the water and gets absorbed by each individual hydrogen bond in a unique way that could be described by the respective water absorbance pattern, WAP. This spectral pattern is indicative for other molecules surrounded by water, too, i.e. reflects the rest of the molecules in the water matrix.