

Aquaphotomics – radically new scientific approach for bio- and food technology

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Aquaphotomics emerged from non-invasive analysis of biological systems using near infrared spectroscopy where water spectral patterns of bio fluids and tissues were found to be highly informative for the health status and have been used as biomarkers for diagnosis.

Nowadays, it has been applied in various fields. One of them is measuring very low concentrations of the solutes using the water mirror effect on molecular level extended over the near-infrared range of the spectrum where the near-infrared light at various frequencies has been absorbed by different pools of water molecules that have changed correspondingly to the concentration of the solute. Other applications are related to water quality and functionality evaluation, understanding functionality of microorganisms and water molecular changes related to amyloid formation, diagnosis of physiological conditions etc., all based on the holistic approach that the knowledge of water molecular system provides.

The future is towards developing the entire “aquaphotome”, i.e. collective characterization of all possible “windows” of electromagnetic spectrum (Water Matrix Coordinates, WAMACS) where water molecular system could be observed. In the future, we expect to be able to explain how the water spectral pattern is related to the food characteristics and functionalities, like freshness. Very important future direction is to understand how water, as the matrix of life, is changing with the time and environmental changes like temperature, humidity, atmospheric pressure.

Biography

Roumiana Tsenkova is professor and head of laboratory at Kobe University. Recently she proposed aquaphotomics as a new scientific field to study the collective characterization and quantification of pools of water molecules that have the same molecular vibration and hold information on structure, function, and dynamics of organisms or aqueous systems.