UV resonant Raman scattering facility at Elettra for detecting the molecular structure and dynamics in biological systems

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It is known that Raman spectroscopy constitutes a powerful means to gain quantitative information on the intra- and inter- molecular structure and on the dynamics of small biomolecules up to more complex macromolecular systems such as proteins, lipids and DNA. In this sense, resonant UV Raman scattering experiments allows to extract additional insights with respect to conventional Raman measurements by exploiting the selective enhancement of vibrational bands associated to specific chemical groups or chromospheres within the sample. This condition, together with the strong reduction of the interfering fluorescence background, determines the usefulness of the UV resonance Raman effect as highly sensitive and selective spectral probe for the study of many open issues in different scientific domains. However, the full exploitation of UV Raman scattering experiments is limited by the lack of tunable excitation sources of appropriate intensity, a situation that practically results in an unacceptable signal-to-noise ratio level.
Here we present a newly developed resonant Raman scattering facility working in the UV spectral range that exploits the tunability of UV synchrotron radiation source available at Elettra. This set-up results in an innovative spectroscopy facility to be used for addressing a large arrays of open issues, especially for researchers interested in biological problems.
Experimental results recently obtained on different case studies of biological interest will be presented, with the aim to demonstrate the high capability of UV Raman scattering experiments for exploring the structure and the dynamics of complex systems, especially in diluted solutions.