IMAGE ANALYSIS APPLIED TO VIPA-BRILLOUIN IMAGES OBTAINED IN HYDROGELS

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Key words: phonons; elastography; tissue phantoms; biological tissues; biopolymers.

Brillouin spectroscopy is an emerging analytical tool in biomedical and biophysical sciences. It measures viscoelastic properties of materials via the propagation of thermally induced acoustic waves or 'phonons' in the GHz range [1-3]. Traditionally, a multipass tandem Fabry-Pérot interferometer has been used in Brillouin measurements, mainly due to the high contrast and spectral resolution of the system [4]. The main drawback being the long acquisition time for the measurement of the single spectrum, on the order of seconds to minutes. Improvements on the acquisition rate (often compromising contrast and resolution) have come from a novel type of spectrometer using highly angle-dispersive Virtually Imaged Phase Array (VIPA) etalons [5].

In this work, we present a method that we developed for the automated retrieval of Brillouin line shape parameters from imaging datasets acquired with a dual-stage VIPA Brillouin microscope. We applied the method to samples made of collagen gelatin hydrogels at different hydration levels and cross-linker concentrations. This work demonstrates that it is possible to obtain the relevant information from Brillouin spectra using software for real-time high-accuracy analysis.

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