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Raman Spectroscopy Tools for Quality Assessment and Sustainable Pigments Extraction from Shrimp Tissues

Bioeconomy plays an important role in the current research fields with crustacean waste valorization being one of the most extensively investigated topics. In this regard, many studies have been conducted on crustacean waste, identifying astaxanthin as the primary pigment found in crustaceans [1,2]. The monitoring of carotenoid profile in the shrimp tissues [3], along with the characterization of the extracts is not yet fully explored.

This study applies Resonant Raman Spectroscopy to evaluate the efficacy of an eco-friendly pigment extraction method on shrimp soft and hard tissues. Acetic acid was used as the extraction agent. Spectroscopic analysis revealed notable pigment extraction in the acidic bath solution, as confirmed through Surface-Enhanced Raman Spectroscopy (SERS) measurements of the extract solutions. The Resonant Raman spectra revealed significant reduction in the carotenoid profile of the shrimp tissues after 12 hours of acetic acid immersion. These findings support the use of mild acids to selectively isolate bioactive compounds while preserving structural integrity, which is consistent with recent research on environmentally friendly extraction techniques in marine biomaterials [4].

Our study highlights Resonant Raman Spectroscopy and SERS as effective tools for tracking pigment extraction, offering insights into sustainable approaches for bioresource valorization in seafood processing.

References

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[3] N. Rossi, Mar. Drugs, 22, 153 (2024)
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Figures

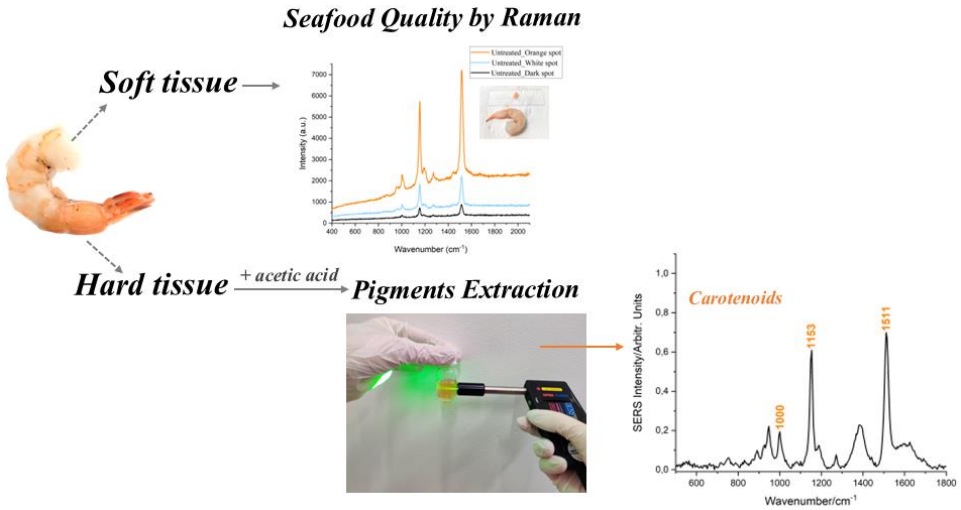

Figure 1: Raman Spectroscopy tools for quality assessment and pigment profiling in shrimp tissues