

## Editorial

# Sustainable Seafood Processing: Utilisation of Fish Gelatin

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Gelatin is a partially hydrolysed product of collagen, which can be applied to different industries, such as food and medicine. Gelatin is formed when the polypeptide chains of collagen are hydrolysed with water molecules under certain conditions such as, thermal and acid treatment [1].

Usually gelatin manufacturer utilises mammalian sources as principle sources to produce collagen. The collagen is partially hydrolysed to generate gelatin. However, Muslims and Jews can't consume gelatin from pork products because of their religion and culture reasons. On the other hand, potential safety issue for gelatin made from slaughtered beef processing byproducts will pose problems such as bovine spongiform encephalopathy. Therefore, gelatins produced from alternative sources are highly desired.

Fish is a promising resource for gelatin extraction. The fish head, bone and skin take up almost half weight of the whole fish, which can be utilised to improve food security in some regions. Furthermore, fish gelatin from fish byproducts has demonstrated better aroma release ability with less off-flavour and characteristics compared to mammalian gelatin [2]. Therefore, it is an ideal alternative for pork and beef gelatin for manufacturers and consumers. The percentage of gelatin derived from fish species has increased continuously, for instance, from 0.7% to 1.3% in the world market from 2003 to 2005, [3]. However, compared to mammalian gelatins, fish gelatins usually have lower gel strength.

Comprehension and improvement of fish gelatin physical properties is considered important for its utilisation. Fish gelatin extraction has been improved to generate gelatin with better texture properties [3]. Since the structure of gelatin affects its physical characteristics, analysis of gelatin structure is indeed necessary in order to further optimise gelatin's properties. To date, gelatin's

structure has not been characterised specifically. Due to its high heterogeneity, characterisation of the molecular structure of gelatin remains a challenge.

Gas chromatography, high performance liquid chromatography, rheometer, spectrometer, scanning electron microscope (SEM), transmission electron microscope (TEM), electrophoretic analysis, differential scanning calorimetry, and fourier transform infrared spectroscopy have been used to determine the major gelatin constituents, physical characteristics, as well as structure. Except SEM/TEM, most other methods could not reveal the configuration of gelatin. Moreover, the structure of gelatin is often compromised by the complex treatment prior to SEM/TEM examination [4].

Atomic force microscopy (AFM), which is an effective method for characterising nanoscale structure, can be applied in imaging gelatin [5]. For example, AFM has been used to characterize the nanostructure of catfish skin gelatin [4;6], which indicates that this method is effective in microstructure characterization. By identifying the structure, the properties of gelatin can be elucidated via the structure. To date, research in fish gelatin has made a tremendous progress in recent years.

Despite the advantages of fish gelatin, the disadvantages should also be considered in future research. For instance, the flavour disruption induced by the addition of fish gelatin to other food products, and the change of texture after the addition of fish gelatin, both of which will have a significant impact on the product acceptability by the consumers. Due to these concerns, technologies such as odour removal should be developed in order to relieve the flavour disruption by fish gelatin. Additionally, the relationship between the structure and texture of fish gelatin should be understood to further improve the physicochemical properties of fish gelatin and meet the demand of customers.

In conclusion, fish gelatin is an admirable substitute of mammalian gelatin. And the resources for fish gelatin from fish processing byproducts like skin and bones are abundant. Fish gelatin has many benefits over mammalian gelatin such as a better release of aroma with less off-flavour as well as its ability to reversibly gel and melt below 37°C [7]. It is promising that the superior function, appropriate quality as well as affordable price of fish gelatin will enable it to be a favorable ingredients for food and medicine industry [8]. Future in-depth research in fish gelatin is needed in order to continue promoting the properties and applications of fish gelatin. Fish gelatin's wide applications will thereby help relieve the contamination of fish processing wastes as well as benefit the sustainable economy.

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