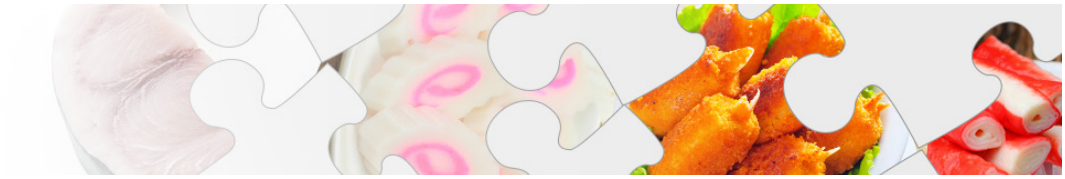
KONICA MINOLTA | SENSING ASIA

THE STANDARD IN MEASURING COLOR

FOOD INDUSTRY COLOR CONTROL

SURIMI PROCESSING



What is Surimi?

The word – "sir-ree-mee" is a Japanese loanword that refers to food products that have been processed by mincing lean meat into a paste to resemble seafood like crabs, shrimps, lobsters and other shellfish. It is a typical fish-based food product that is made from fish meat that includes the Alaska Pollock, Atlantic Cod, Pacific Hake and Swordfish. Many Asian food use surimi as its primary ingredient and is a much-enjoyed food product which is very popular in Asian cultures. Surimi attains a rubbery and springy texture when they are cooked and served. Common Surimi product in the market comes in different shapes, forms and textures which are also known as crab sticks and seafood sticks.

History and Popularity of Surimi

Originated in Japan several centuries ago, surimi is one of Asia's diet. Common usage of surimi is to make california rolls, sushi and fish sausages also known as "Komoboko". These Japanese food crafts have made surimi products well known worldwide. It is widely accepted in America around 1970 and in Europe around 1980. The popularity and demand escalated sharply in 1983. Since then, surimi could be found in almost any supermarket and consumed worldwide because of its low fat content and high nutritional value. Currently, 2 to 3 tons of fish harvested around the world is used in the production of surimi. The United States of America and Japan are the two major producers of surimi products.

Surimi Processing

Surimi is made by washing minced flesh with water and mixed with sugar and other additives and then frozen into blocks. Food processing companies use surimi blocks and shape it to look like imitation crab meat, fish ball and so on. Surimi is popular in many Japanese restaurants, widely consumed, and is available in many supermarkets because of its long shelf life.

Firstly, raw fish is skinned and deboned. The fillets are minced, washed and then strained to get a concentrated fish paste. The final refinement is to separate into different grades and then dehydrated. The frozen process is called cryoprotectants, which will flash freeze the surimi blocks in order to keep its freshness and quality.

Color Perception of Surimi

In the food processing industry, color indicates the freshness and superiority of the product and is often at times a quality indicator. For example, fresh, chilled, and frozen packages of surimi products today are more eye appealing than the nose appeal. Surimi producers know this well as the quality of surimi is determined by its color and they are increasingly adopting instrumental color assessment technologies to control the quality.

Color Assessment

Instrumental color measurements are used in a number of ways when it comes to the production of surimi. Most of the time, they are used during the initial grading of raw material at the incoming quality checks. The colorimeter can, for example, be used to check the color of lean meat of the fish to determine whether it falls within the limits of its specification for color. These colorimeters allow color analysis that can be carried out in various processing stages such as:

Research and Development

- To determine the amount of additives used in surimi to enhance its 'whiteness' (eg. by removing yellowish pigment).
- To determine the effect of storage period and method on the quality of surimi (eg. whiteness)

Process Control

- Monitoring of washing process (reduction b* - yellowness value) and ingredient mixing (whiteness enhance)
- Monitoring of post-pasteurization color of surimi.
- Grading of final product (usually based on its whiteness value).

Colorimeter for Surimi Assessment

Colorimeter measures a food sample as it appears under daylight by using a lamp to provide a consistent lighting for each measurement. The lamp illuminates a sample and the reflected light is analysed to give a color space data like CIE L*a*b*. It is designed for color difference measurement and is very useful to help food producers and technologists to determine whether a product is within the color specification. The data given is valuable as it provides a guide in color consistency.

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Type of Color Analysis

Whiteness variance is normally indicated by whiteness indices, such as:

- Whiteness (Hunter): WHU = L – 3b
- Whiteness (Hunter): $WH = 100 - [(100 – L)^2 + a^2 + b^2]^{1/2}$

The unwanted yellowness in surimi is determined by the *b value, or Yellowness Index. Redness value, which is indicated by the a* value, is normally used by some food producers to determine the freshness of raw material. To confirm the color when colorant is used in the final products (eg. imitation crab meat), all L*a*b* values will be used.

Type of Color Instrument Accessories

Colorimeters are generally portable instruments that are suitable for any kind of food samples. Using a granular material attachment, surimi paste can be placed into this accessory holder for easy access to non-solid food samples for quick and accurate color measurement.

For measurement of wet surfaces or to ensure that the food samples are flat during measurement, a light projection tube which has a glass plate at the tip can be useful. This prevents any external substances like liquid to enter the sensor.

Lastly, measurement data transfer is straight forward with the SpectraMagic NX software for color data processing, indices calculation and spreadsheet export. These features are comprehensive yet easy to use even for the non-experts.

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