IMAGING OF FIBRES IN EMULSIONS

Marjolein van Ruijven¹, Ellen Drost¹, Jaap Nijssë¹, Gerard van Dalen¹, Stephan Schumm² and Sudarshi Regismond²

¹Advanced Measurement Imaging and Data Analysis, ²Foods Structural Design
Unilever R&D, P.O. Box 114, 3130 AC Vlaardingen, The Netherlands
E-mail: Marjolein van.Ruijven @unilever.com

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With the growing interest of consumers in an active, healthy lifestyle, they are demanding high quality products that will provide them with guilt-free eating experiences. As part of Unilever’s Vitality mission, the company is committed to providing healthier products for its consumers. Because of this, they are actively looking for value added ingredients that will meet consumer acceptability. An example of such ingredients is unused plant materials such as fibres. Since these are natural ingredients, it was important to understand their structure and functionality and how they performed under various processing conditions. It was found that the fibres are a mixture of cell wall debris and xylem vessels, which behave differently in water. The functional properties of the fibres are dependent on the processing conditions. For this, an understanding of the microstructure is essential. The Microscopy and Image Analysis group in Vlaardingen is involved in understanding the microstructure of the raw materials and the functionality of the fibres in oil-in-water emulsions.

The effect of processing on the fibres in water is studied. The cellulose part of the citrus fibres is stained with a specific cellulose dye and studied using Confocal Scanning Laser Microscopy (CSLM). 3D images give information about the interaction among fibres. Scanning Electron Microscopy (SEM) is used to observe the effect of processing at a higher resolution. The change in the structure of the cell wall is studied. Individual cellulose micro-fibrils, originating from the cell wall, are discernible. The width of the original cell wall swells up to 100x after processing of the fibres. In an emulsion, light microscopy is used as a standard screening method for fibres. The interaction of the fibres with other ingredients is observed using CSLM and SEM.

Figure 1: Images of processed fibres using CSLM and SEM (left: 3D CSLM image, 387*387*62 µm and right: 2D SEM image, 40*30: µm)