

AFTERNOON

EXH 1: Technology Showcase

Chair(s): B. Cooke, Dallas Group, USA; and G. Hicks, Dallas Group, USA

Life Molecular Profiling with TCS CARS - CARS at Video Rate. S. Landwehr, V.V. Krishnamachari, W.C. Hay, Leica Microsystems CMS, Mannheim, Germany

Nowadays sophisticated food studies rely mainly on chemical techniques which reveal only a few and often isolated aspects of a sample. As the focus of food science concentrates more on intact systems like dynamics of lipid components in living cells, compound migration or lipid distribution in dairy products, more detailed information of these structures is needed. CARS (Coherent anti-Stokes Raman Scattering) is a label-free technology which visualizes the characteristic intrinsic vibrational contrast of molecules. The integration of CARS into a confocal system results in images which deliver more and even more detailed information of internal properties of food or biological samples. In Leica's TCS SP5 CARS, a fully integrated solution based on a true confocal system, the CARS signal is generated by two picosecond infrared lasers which are spatially and temporally aligned and coupled into the confocal scanner. The result is highly sensitive imaging at sub micron resolution without any staining or altering of the sample. In addition, Leica Microsystems offers a resonant scanner for fast data acquisition at video rate, up to 29 fps. We show our recent studies on food and biological samples using TCS SP5 CARS demonstrating high performance vibrational contrast imaging.

Efficient Heat Transfer Equipment for Oilseeds Preheating. W. Zapata, Solex Thermal Science, Calgary, Alberta, Canada

Use of innovated technology for preheating or conditioning of oilseeds in the crushing plants that can provide operational flexibility, energy savings and lower operational and maintenance cost. This technology is based on a modular plate heat exchanger design that provides the operators with energy efficient choices for the operation of the crushing plant. The operational flexibility includes varying input seed conditions, use of different sources of energy and precise control of moisture and temperature of the seed at the outlet. The science behind the technology requires accurate thermo-modelling of heat transfer in a bed of solids, this enables customized designs which at the same time can precisely predict and control outlet conditions of the product. The modular design lends itself very well to future expansions or change in heat source. The system can also easily run and switch between heat sources like hot water and steam. The system can efficiently utilize low grade wasted heat providing monumental saving in steam consumption. The operational and maintenance costs are significantly lower than conventional methods, as the equipment uses minimal moving parts and low abrasion design.

Analytical Methods for Controlling and Optimizing Purifine PLC Degumming at Plant Scale. D. Walsh, Verenum Corporation, San Diego, CA, USA

The economic and process benefits of using enzymes for degumming and refining of seed oils are now widely known. Several oilseed processors have now had successful implementations of enzyme-based processes. The perception of success has been enabled by several novel analytical methods. These techniques can be applied prior to implementation to predict enzyme performance and economic benefits. During plant start-up the same techniques are used to optimize and monitor process performance. In combination with traditional process analysis, these analytical techniques are applied to consolidate plant performance, confirm yield gains and economic benefits.

Evaluation of Dedicated FT-NIR Oil and Oil Seed Analyzer. Hui Li, Bruker Optics, Inc., Billerica, MA, USA

Near infrared spectroscopy was widely used in oil seeds and edible oil processing for quality control and assurance due to its fundamental benefits such as fast analysis with no sample preparation. Normally the methods or models will be developed at the central lab and later on need to be transferred to plants. A versatile spectrometer with powerful software is needed for method development while a dedicated, rugged instrument with intuitive, simple to use interface is desired for plant or field use. Furthermore, model transfer between these two types of instrument should be direct. This presentation will briefly describe the new dedicated Bruker FT-NIR analyzer: Tango series, which simplifies the NIR analysis with fast measurements for high sample throughput, simultaneous evaluation of different components and an intuitive handling, without need for expertise training. And the author will also evaluate method transfer between Bruker's existing multipurpose analyzer MPA to dedicated Tango system.

Inuline Derivatives — The Latest on Application and ECO-nomics of CMI and Cationic Inulin. R. Nolles, Cosun Biobased Products, Breda, The Netherlands

Cosun Biobased Products is the world's main manufacturer of Carboxy Methyl Inulin (CMI), a green scale inhibitor used in various detergents and water treatment products. Recently Cosun has developed a range of cationic inulin derivatives. CMI is a chemical derivative produced by carboxymethylation of inulin. Inulin is a reserve plant polysaccharide extracted from chicory roots and is a renewable raw material. CMI offers an unique combination of anti-scaling, sequestration and dispersing properties. CMI is a threshold scale inhibitor for CaCO₃, CaSO₄, BaSO₄ and SrSO₄ scaling with excellent calcium tolerance, high water solubility and low viscosity. It is an alternative for traditional fossil and phosphorous based chemicals. In numerous applications CMI has proven to be a cost-effective antiscalant. Examples of applications for CMI in detergents are laundry and automatic dishwashing. Cationic inulin can be applied in fabric softener or hair care products for surface modification. Moreover, it shows coagulant properties making it suitable for use in water treatment. In the lecture recent application research results for automatic dishwashing will be presented. In addition, more insight will be given in the ECO-nomics of inulin derivatives.

Recent Advances of Benchtop NMR in the Food Manufacturing and Agriculture Industries. K.P. Nott, A.I. Sagidullin, D. Williamson, J.P. Cerroti, D. Gillett, Oxford Instruments Magnetic Resonance, Abingdon, Oxfordshire, UK

Benchtop NMR is a well-established spectroscopy technique, which has been successfully adopted and used to measure oil, moisture and solid fat content in food and agricultural products over many decades. This analytical method has many advantages over other modern physicochemical techniques including being non-invasive, non-destructive, solvent free, reproducible and simple to calibrate without interference from other components. In addition, it can be successfully applied to analysis of various sample sizes ranging from a single seed with mass of a few hundred milligrams up to samples of one hundred grams. In addition to measuring oil content of commercial crops, bench-top NMR has also been used to increase the oil yield by crop research (breeding) or simply by analysing the residue after extraction to optimise this process. Furthermore, measuring solid fat content during cooling (isothermal crystallisation) rather than at static temperatures (the AOCS method) allows differentiation of oils based on their composition, in particular their diglyceride content, which may vary with geographical location. We conclude by discussing the future scope of bench-top NMR for physicochemical characterisation of oils/fats.

A Single Method for the Direct Determination of Total Glycerols in All Biodiesels Using Liquid Chromatography and Charged Aerosol Detection. M.A. Plante, B. Bailey, I.N. Acworth, Thermo Scientific, Chelmsford, MA, USA

Biodiesel provides a clean and renewable, liquid fuel that can be used in current diesel engines and oil burners without any or significant modification. Using natural oils as a feedstock, ranging from virgin or waste cooking oils to algal oils, biodiesel is an esterified form of these oils. The simplest reaction uses a basic esterification reaction using methanol, sodium hydroxide and heating. The reaction esterifies the acylglycerols of the oil, producing fatty acid methyl esters (FAMES), which is the biodiesel fuel. Harmful impurities, existing as unreacted acylated and free glycerols must be removed to avoid fuel-system damage. The current ASTM method uses derivatization and gas

chromatography, but it cannot be used for the analysis of in-process materials or biodiesel-petroleum blends. Other HPLC methods have separate methods for acylated or free glycerols, and another hydrolyzes the acylated glycerols to free glycerol, which is a loss of information. This normal-phase HPLC method provides a measurement of all acylated and free glycerols with a sample dilution and provides for an underivatized Free and Total Glycerides determination of all in-process, B100, and mixed petroleum blends, and it satisfies the current ASTM requirements.

Innovative Hydrogen Solutions. S. Ivanova, Air Products and Chemicals, Inc., Allentown, PA, USA

Do you need hydrogen—either high or low pressure, small or large volumes? Air Products is a world leader in the safe and efficient supply of merchant hydrogen for a wide range of industries. In this presentation we will discuss how Air Products can help take the guesswork out of selecting the lowest cost, most reliable hydrogen supply mode for your application. We will discuss technologies such as our Cryogenic Hydrogen Compressor (CHC) systems and onsite PRISM® Hydrogen Generators. The CHC system is a patented liquid hydrogen supply system that instantly matches changing production needs, resulting in reduced operating costs and minimum downtime. PRISM Hydrogen Generators are based on advanced proprietary technology and are the most efficient onsite generators on the market today, having the highest turn down and consuming the least amount of natural gas.

Increase Your Profits using ProFoss In-Line Monitoring and Control During Soy Meal Production. O. Rasmussen, B. Schumann, FOSS North America, Eden Prairie, MN, USA

Scenario: Soybean Plant crushing 100,000 ton/year using FOSS Profit Improvement Process could increase profits by as much as \$600,000 per year. Continuous process monitoring in oil seed processing is becoming increasingly important. Consistent and high-quality standardized products manufactured at low cost are a key goal for competitive success in a global market. The ProFoss helps you achieve this goal by reducing variation and streamlining your soybean processing process. For our loyal System II (5000/6500) and InfraXact customers, come see the next revolution in NIRS technology, the FOSS DS 2500 and DA 1650!

Thermodynamics of Continuous Liquid/Solid Separation. Rob Williams, Anderson International Corp., Stow, OH, USA

Compositional Analysis of Consumer Products: A Valuable Tool for Market Trends and Research Studies. F. Pala, Battelle, Duxbury, MA, USA

LTMP ? A New Phosphonate for I&I Applications. J. Kolpa, Thermphos USA, Red Bank, NJ, USA

Until recently, it was impossible to get the performance delivered by a traditional phosphonate in a product with a sustainable profile. Recently Thermphos? Dequest business introduced LTMP, Lysine Tetra(Methylene) Phosphonate which is based on the renewable resource lysine. Dequest?s LTMP has a renewable carbon level of 60%, biobased backbone, and the performance of a traditional phosphonate. Product applications include laundry, autodish, bottle wash, and other I&I and home applications.

TUESDAY

AFTERNOON

Chair(s): T. Neuman, GEA Westfalia Separator Inc., USA

Oilseed Preheating Heat Recovery Optimization. Farah Sköld¹, Etienne Le Clef², ¹Solex Thermal Science Inc, Calgary, AB, Canada, ²Desmet Ballestra Group, Zaventem, Belgium

The use of waste heat from various sources within a crush plant can result in substantial savings on overall energy consumption. The use of waste heat in from of hot water can lower or in some cases eliminate the steam consumption during pre-heating/conditioning step in the preparation plant. The optimized heat recovery loop is based on low maintenance equipment that provides optimal thermal performance. The design offers operational flexibility to enable operator to handle varying feed input conditions. Moreover the system allows the use of different heat sources, hot water and steam. With changes in availability of recovered energy during normal or plant upset conditions the system can be adjusted to provide desired outlet seed properties.

Setting New Benchmarks for Efficiency and Productivity. Pablo Garcia, Siemens Industry, Inc., Spring House, PA, USA

The world of oils and fats is rapidly changing. Soaring prices for raw materials, energy and increasingly stringent regulations are forcing companies to look for efficient solutions to remain competitive while ensuring consistent product quality. To enable successful edible oil production, Siemens offers a range of products, solutions and services tailored to your unique requirements. Modern automation systems not only provide efficient operation, but also focus on transparency, energy conservation, reliability and availability. Transparency helps to better understand a company's own production and identify new optimization potential. Material and Tank Management tools provide real time data on storage location content, properties and operational status, and provide the necessary information to help make correct decisions and avoid potential operational errors. Material transports can be planned, controlled, monitored and diagnosed while each movement is recorded and stored via an Archive Manager, providing tracking and tracing capabilities. Energy conservation is accomplished with energy-efficient drives and smart motor control centers providing the necessary information for intelligent power management. Diagnostic capable products support preventive maintenance, lower maintenance costs and increase reliability. The result: an automation system that controls, manages the energy and monitors the condition of plant assets.

New Innovations in Oil Seed Preparation. Charles Brockmeyer, Buhler Inc., Plymouth, MN, USA

BASF: Catalyst and Adsorbent Supplier to the Oleochemical and Biorenewable Industries. Doug Okonek¹, Thorsten von Fehren², ¹BASF Corporation, Beachwood, Ohio USA, ²BASF SE, Ludwigshafen, Germany

Purification of Glycerin from Biodiesel Plants. Perry Alasti, Artisan Industries Inc., Waltham, MA, USA

With the expected growth of biodiesel production in North America thanks to the passing of RFS-2, coupled with the global political turmoil causing oil prices to reach \$100/barrel and higher, we can expect a glut of crude glycerin in the coming years, as more biodiesel plants come on stream and existing plants will begin to ramp up production. Refining glycerin to various purities will be instrumental in insuring profitability regardless of feedstock and energy costs. We will present Artisan's refining process and compare it with two alternate processes currently available in the market.

Design Aspects of a Modern Pressing Plant. H.C. Boeck, HF Press+LipidTech, Hamburg, Germany

WEDNESDAY

N/A
