VAMAS

Nanoparticle Populations

Technical Work Area 34

Project 8

Determination of total sulfur and sulfate half ester content in cellulose nanocrystals

Objectives

This inter-laboratory comparison (ILC) aims to assess the performance and validate two methods for sulfur determination for Cellulose nanocrystals (CNC). It is anticipated that the results of this study will provide a basis for the development of future international standards.

Background

CNCs are one member of a family of emerging cellulose nanomaterials with significant commercial potential. Most processes for CNC production generate negatively charged surface groups which lead to stable aqueous colloidal suspensions and provide opportunities for surface modification to increase the compatibility of CNCs for incorporation in nanocomposites or for biomedical applications. The extent of surface functionalization is therefore a key parameter for quantification for most CNC applications.

The methods are conductometric titration which measures the surface sulfate half ester content in mmol/g (dry mass) CNC and inductively coupled plasma optical emission spectroscopy (ICP-OES) which measures the elemental sulfur content.

Standardization Needs

Standardization activities for cellulose nanomaterials have already been initiated in two ISO committees. At ISO TC 229 – Nanotechnologies, a technical report on cellulose nanocrystal characterization has been published and a project on Terminology for Cellulose Nanomaterials will be completed soon. A project on sulfur determination is in progress at ISO TC 6- Paper, Board and Pulp.

Work Programme

The ILC will use dry CNC for ICP-OES or 2% by mass suspensions prepared using a standard protocol from dry CNC (for conductometric titration).

Additional validation materials will also be provided. Participants will be requested to measure 3 units of CNC by one or both methods (depending on lab expertise).

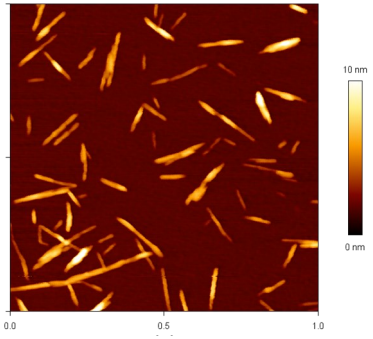
Detailed protocols will be provided for each method.

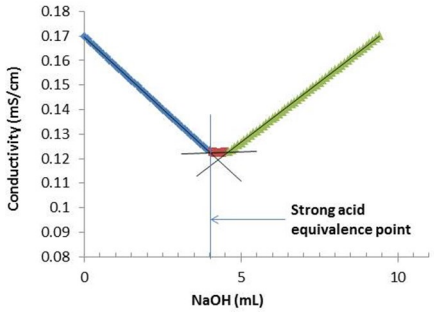
Deliverables and Dissemination

Results from the interlaboratory comparison will be used for:

- Method validation for sulfur determination of CNCs
- Publication of the results of the ILC, VAMAS technical report
- input for ISO technical specification on sulfur determination for CNCs
- Dissemination at relevant conferences

Call for Participation





Participation / Funding

Participants with expertise in sulfur content determination by one or both methods will be recruited. Participation is based on in-kind contributions from the partners.

Status

Samples will be distributed in late 2016. Call for additional participants.

For more information on participation, please contact

Dr. Linda Johnston
Project Leader
National Research Council Canada
linda.Johnston@nrc-cnrc.gc.ca

Dr. Jeff Fagan
Chair, VAMAS TWA 34
NIST, USA
jeffrey.fagan@nist.gov

www.vamas.org

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