



## Ebatco Nano

A Monthly Newsletter

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### **Nano Brief**

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This month in the nano world:

- The global market for products using nanotechnology is projected to reach US\$2.4 trillion by 2015 in a study by Global Industry Analysts, Inc.
- The Nano Science and Technology Consortium, NSTC, has announced a web-based Nanotechnology Training Certification Program to increase exposure to nanotechnology in science and engineering.
- Scientists in the Netherlands created an electric nano car roughly the size of a single molecule. Their creation shows that a single particle can be driven by external electrical energy.

### **Ebatco**

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At Ebatco, we offer more than just lab services at nano and micro scales. We represent a number of world-leading companies who specialize in nanotechnologies and surface analytical instruments. One such company is Kyowa Interface Science Co. Ltd. of Japan. Kyowa is an industry leader with over 60 years of experience in designing and manufacturing surface analytical instruments.

One of the Kyowa instrument lines is Contact Angle Meters, also referred to as Goniometers. The Kyowa Contact Angle Meter line incorporates high speed cameras with long lasting LED light sources to capture static and dynamic droplet shapes for contact angle measurements. For smaller samples down to microns in dimensions, such as stents and fibers, the Micro Contact Angle Meter, MCA-3, can be used to take accurate measurements by working with droplet sizes in the nanoliter and picoliter range. MCA-3 employs high speed cameras with up to 100,000 frames per second capturing speed to analyze contact angle and droplet shape changes along time. All Contact Angle Meter lines utilize the intuitive FAMAS software package to measure contact angle, advancing and receding angle, liquid surface/interfacial tension and solid surface free energy.

Kyowa also offers instrumentation designed for measuring liquid surface tension and interfacial tension. The DyneMaster series is capable of using both the Wilhelmy Plate and du Nouy Ring methods for measuring surface tension and interfacial tension. Optional

upgrades allow for powder contact angle and dynamic contact angle measurements carried out on the DyneMaser series of surface tensiometers. The BP-D series measures the dynamic surface tension through maximum bubble pressure method. Dynamic surface tension is important for applications where the speed of surface tension change is critical such as in solutions containing surfactants and detergents.

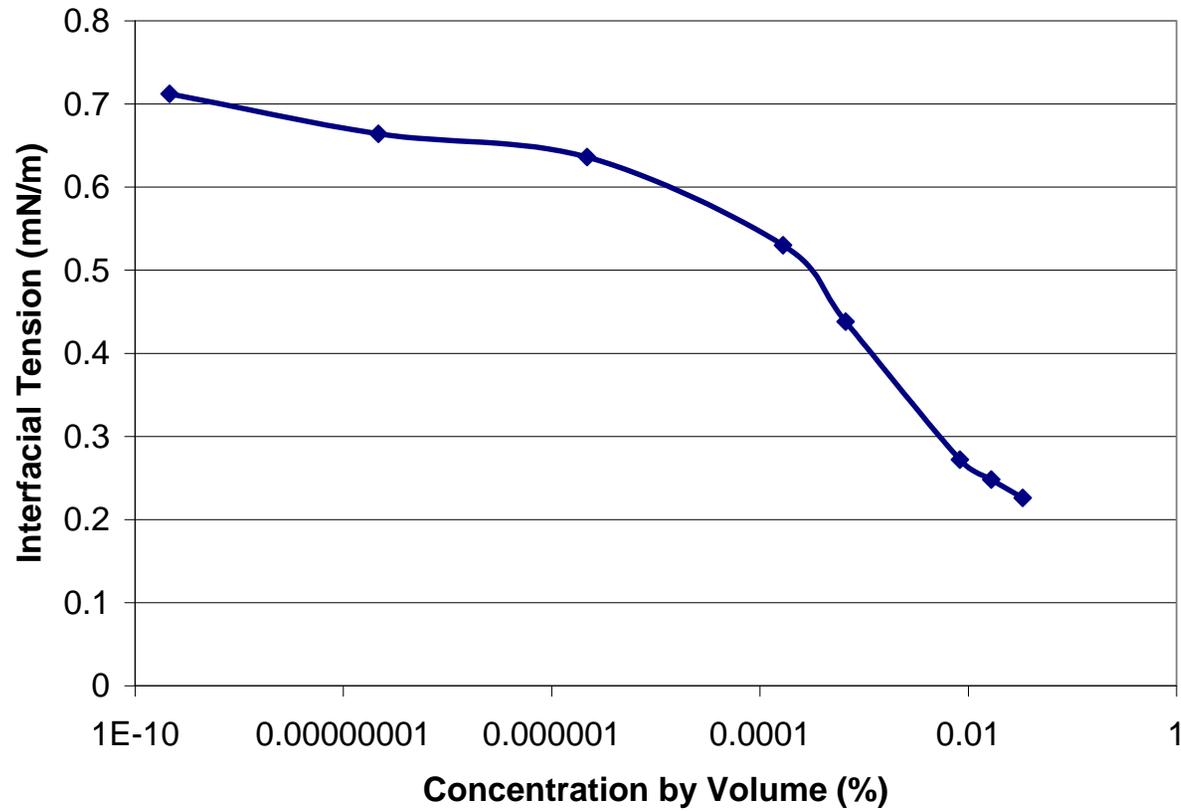
Another instrument line offered by Kyowa is the Friction Meter line, specifically the TS-501 Automatic Surface Abrasion Analyzer. The TS-501 uses a variety of contact parts with different geometries to fill the application needs. The instrument can measure a sample under controlled load, testing cycles, sliding speed, or measure different samples in the same routine to determine both the static and kinetic friction coefficients. It is also an ideal choice for wear study of light load under dry or lubricated conditions.

### **Case Study**

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Water is one of the liquids with high surface tension. A common application for water is in the cleaning of grease, oil, food and other matter from a surface. The high surface tension of water makes it ineffective for removing certain material, such as oil, from a surface when used alone. Detergents containing surfactants are added to water to reduce its surface tension. Reducing the surface tension allows for the detergent solution to envelop and remove the undesired materials. Several factors that affect the surface tension are the pH level, temperature and surfactant concentration. Controlling these parameters can maximize the overall cleaning effectiveness.

The data presented here is the interfacial tension of a common dish detergent at its water solution/vegetable oil interface. The data indicates that interfacial tension with vegetable oil can be reduced significantly by adding about 0.01% volume ratio detergent into water. The interfacial tension was measured with a Kyowa DY-700 Surface Tensiometer using the Wilhelmy Plate method at room temperature. With a heating jacket type stage, the DY-700 can also measure interfacial tension at different temperatures.



Interfacial Tension of a common dish detergent water solution at a vegetable oil interface with changing concentrations.

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