COSMETIC AND DERMATOLOGICAL

BACKGROUND

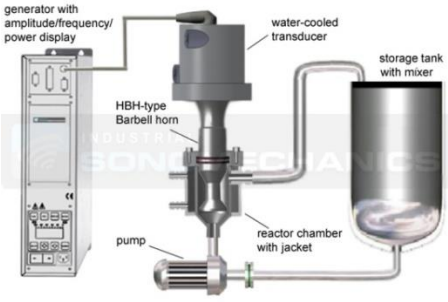
The ability of high-power ultrasound to make nanomaterials, such as nanoemulsions, nanocrystal dispersions, and liposomes, makes it invaluable for producing a wide variety of cosmetic products, including sunscreens, creams, lotions, moisturizers, shampoos, conditioners, makeup, etc.

In cosmetics and dermatological industry, nanomaterial-based products are mainly used 1) as delivery systems for active lipophilic compounds and drugs and 2) as UV blockers. The application as delivery systems enables cosmetic products to transport active agents and drugs through the skin, giving the products important therapeutic properties ranging from enhanced skin hydration to anti-inflammatory, anti-oxidant, anti-aging and hair loss preventive. In addition, it is possible to design the products to release the actives in a slow and controlled manner, thereby extending their effects (for example, for long-acting therapy or slow perfume release). The application of nanomaterials as UV blockers mainly takes advantage of UV filtering properties of titanium dioxide (TiO2) and zinc oxide (ZnO) nanosuspensions. These metal oxide particles are commonly used in sunscreens and moisturizers. Breaking down or dispersing the particles down to the nanometer scale (about 200 nm) ensures that, unlike in traditional sunscreens based on larger particles, much higher degree of translucency is achieved along with better absorption by the skin and enhanced rheological properties. Polymeric nanoparticles are also sometimes used for this application.

PRODUCTION WITH HIGH-AMPLITUDE ULTRASOUND

Industrial Sonomechanics, LLC (ISM), offers bench and industrial-scale high-power ultrasonic processors for the production of nanomaterials. The processors are based on our patented Barbell Horn Ultrasonic Technology (BHUT), which, as explained below, makes it possible to directly implement laboratory accomplishments in a production environment, guaranteeing reproducible and predictable results at any scale.

Very high ultrasonic amplitudes are required for efficient particle size reduction. The necessary shear forces are created by ultrasonic cavitation, which produces violently and asymmetrically imploding vacuum bubbles and causes micro-jets that disperse and break up crystals, agglomerates, and oil droplets down to the nanometer scale. Known for many decades, this effect of high-amplitude ultrasound has been extensively studied and successfully used in laboratory-scale research. However, prior to the introduction of BHUT, none of the existing ultrasonic liquid processors could generate the required amplitudes on the industrial scale. Commercial implementation of high-power ultrasound has, therefore, been limited to processes for which low amplitudes are sufficient (cleaning, simple deagglomeration, mixing, macro-emulsification, etc.).



Why ISM's Ultrasonic Technology?

Conventional high-power ultrasonic technology inherently forces all processes to run either at a small scale and high amplitude or a large scale and low amplitude. ISM has successfully overcome this limitation by developing BHUT, which permits constructing industrial-scale ultrasonic processors able to operate at extremely high amplitudes. The processors are directly scalable and can be used in the commercial production of high-quality nanomaterials for the cosmetics and dermatological industry. Our equipment is compact and relatively low-cost, needs little technical support, includes very few wetted

parts, generally requires no special pre-treatment of precursors, and is potentially self-sterilizing due to antibacterial properties of high-intensity ultrasound.

HAVE QUESTIONS?

Request a free initial consultation with a process specialist

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