

REMOTE RESEARCH SEMINAR SERIES

The Center for Dermal Research Welcomes

Dr. Gabriella Baki, University of Toledo
College of Pharmacy and Pharmaceutical Sciences

*“Linking Consumer Sensory Perception with Rheology and Texture Measurements for
Six Cosmetic Emulsions”*

Monday, April 25, 2022 5:30pm EST



Gabriella Baki is an associate professor at the University of Toledo College of Pharmacy and Pharmaceutical Sciences. She serves as the program director and main instructor for various lectures and laboratories in a unique undergraduate program, the BS in Pharmaceutical Sciences Cosmetic Science and Formulation Design major. It is the first and currently the only undergraduate program in the United States that focuses exclusively on cosmetics and personal care products. Dr. Baki is a pharmacist, graduated in 2008 from the University of Szeged, Hungary; and she also has a PhD in Pharmaceutics from the same university. She has been a faculty member at the University of Toledo since January 2012.

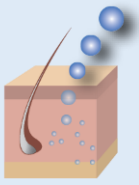
Dr. Baki's main research focus lies in the area of topical delivery for active ingredients and cosmetic actives, sensory testing of creams and lotions, as well as sun protection factor and broad-spectrum boosting technologies. Dr. Baki has made over a dozen technical presentations and written over 40 publications. She has contributed to a few book chapters and has a book, *Introduction to Cosmetic Formulation and Technology*, published by John Wiley and Sons.

Abstract: The sales potential of cosmetic products is greatly influenced by skin feel and sensory performance. To create emulsions that meet consumers' skin feel expectations, it is essential to include consumers in the product development process and evaluate consumers' perception of products. Our research group designed three groups of emulsions, including two steric-stabilized O/W emulsions, two liquid crystal-stabilized O/W emulsions, and two W/O emulsions, each of which had different aesthetic characteristics. Within a group, one emulsion had a light emollient, heptyl undecylenate, the other had a blend of the light and a heavier emollient (olive oil). Our goals were to 1) qualitatively evaluate the emulsions' sensory characteristics by consumers before, during, and after application using a rapid profiling method, i.e., Check-All-That-Apply (CATA) survey; 2) quantitatively characterize the rheology, texture, friction, and wear of the emulsions; and 3) identify statistical relationships between the qualitative and quantitative evaluations. First, we had fifty untrained consumers evaluate the emulsions based on appearance, pick-up, rub-out, and after-feel attributes using a 30-word CATA survey. Statistical analysis included Skillings-Mack test, hierarchical cluster analysis, and multiple factor analysis.

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In the next step, the rheology, and textural properties of the six emulsions were quantitatively characterized and statistical relationships were identified between the consumers' description of products and the instrumental measurements. Four sensory-like attributes, including firmness, work of shear, stickiness, and adhesiveness were tested using a texture analyzer. Rheological characterization included continuous flow testing and oscillatory measurements. Univariate Poisson regressions were used to explore the relationships between sensory and instrumental measurements. In the final step, we are exploring a novel quantitative method, tribology, to further characterize our emulsions.

Our findings showed that untrained consumers effectively discriminated between the three types of emulsions and correctly described the emulsions using the CATA survey. The CATA results showed that consumers found the olive oil emulsions more gluey/sticky and said their skin became more oily/greasy after applying these emulsions. A major finding was emulsifiers, not emollients, have the dominant role in determining the sensory characteristics of skin care emulsions – which was shown previously, but with a trained panel. The instrumental measurements confirmed that emulsifiers made a more substantial impact on the textural properties than the emollients. It was also found that olive oil increased the firmness, spreading, stickiness, viscosity, and droplet size of the emulsions within each group. CATA questions can serve as a viable complementary to descriptive sensory analysis. We demonstrated that certain sensory attributes can be reliably predicted with instrumental measurements. While our studies had the limitation of using only six relatively simple emulsions, the results are promising in terms of both the CATA survey and the correlation between the sensory and instrumental analysis. Further studies should be performed with a larger number of emulsions to establish more robust correlations between the texture-rheology-sensory measurements.

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