

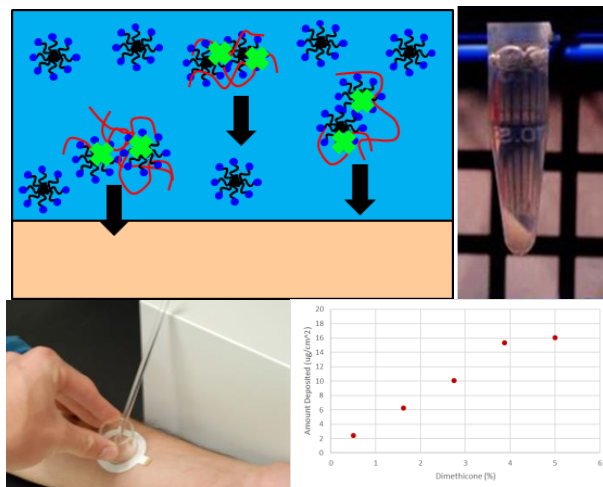
## MULTI-METHOD IN-VITRO AND IN-VIVO EVALUATION OF COACERVATION AND DEPOSITION BEHAVIOR IN CLEANSING FORMULATIONS

Matthew Lohr, Ph.D., Beauty Innovation Platforms, Johnson & Johnson Consumer Inc, Skillman, NJ  
mlohr@its.jnj.com

Tobias Futterer, Ph.D., Beauty Innovation Platforms, Johnson & Johnson Consumer Inc, Skillman, NJ

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The inclusion of cationic polymers in cleansing formulations is a commonly utilized practice to provide conditioned after-feel to skin and hair and increase the efficiency of insoluble benefit agent deposition. However, predicting the efficiency of polymer-surfactant complexation (coacervation) and the resulting deposition efficacy of polymer complexes and insoluble actives purely from formulation components remains a challenge, due to the complex interactions of polymer, surfactant and solution properties. In this work, we validate and implement multiple methods for rapidly screening and quantifying dilution-induced polymer precipitation and deposition in cleansing formulations. We then utilize these methods to verify and compare deposition behavior in several well-utilized polymer-surfactant systems and commercial cleansing products.



*Figure 1: (Top left) Qualitative illustration of polymer-surfactant micelle complexation and deposition of insoluble actives to skin in a dilute cleanser formulation; (top right) Polymer-surfactant coacervate centrifuged down from a dilute cleanser; (bottom left) Cup-scrub method for extracting water-insoluble actives from surface of the skin after cleansing; (bottom right) Dimethicone measured on skin after cleansing as a function of dimethicone incorporated into original undiluted cleansing formulation.*