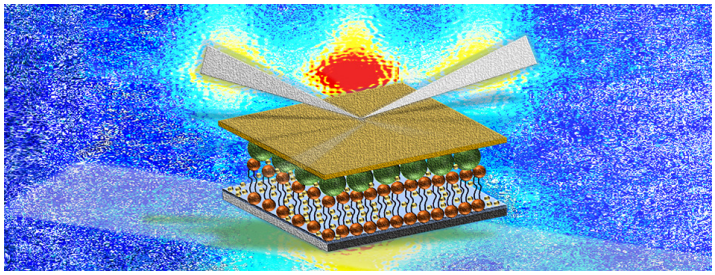

Beitrag ID: **41** Typ: **Talk**

# Interdiffusion of polymer and water in waterborne polymer latex films

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Waterborne latex films, obtained from the dispersion of latex particles are of particular interest due to the non-content of volatile organic compounds (VOC), often mandatory under environmental legislation.1 However, abrupt water penetration inside the films restricting their lifespan and deteriorating the shining of the coating. In order to prepare efficient and solvent-free coatings with the low glass-transition temperature (Tg < the drying temperature) but with higher mechanical strength, we have integrated hydrophilic layers (Acrylic acid/ Poly(acrylamide)) around the hydrophobic cores (mixture of Methyl methacrylate and Butyl acrylate) and also hard shell around the soft core in the latex film. Latex particles with different morphology (hairy layer variants and core-shell particles) have been synthesized using emulsion polymerization.2 Polymer latex films have been prepared in the next step by evaporating water in a thermo-humidistatic chamber at temperature 25 oC. The structure formation of polymer latex films in the dry state (crystallinity) and in re-swelled state (change in crystallinity and whitening or blushing) have been studied to propose a recipe for the preparation of efficient latex coatings. The Small-Angle Neutron Scattering (SANS) study shows the FCC-like structure formation by the latex film, which become more organized with the inclusion of the hydrophilic shell. The hydrophilic shell also promotes the formation of the homogeneously water-swollen film and slows down the development of water "pockets", preventing the deterioration of the latex film over time. On the other hand, the inclusion of hard shell protects the latex films from water whitening and provides additional mechanical strength. The interdiffusion between the latex particles has been analyzed by mixing H/D polymers. The transfer of polymer chains through interparticle boundaries that vanishes the crystalline structure and results in a formation continuous material.

References:
1. Konko et al. Langmuir. 2019, 35, 6075.
2. Abdeldaim et al. Macromolecules. 2023, 56, 3304.

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