

Innovative Foam-Based Cleaning Concepts for Historical Objects

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The historical surfaces of artistic and cultural objects can be regarded as the ‘faces’ of these pieces of art. The surfaces are often soiled as a result of long-term exposure to environmental influences. Their cleaning represents important challenges as each surface requires a tailor-made cleaning method to remove dirt without damaging the art piece. Recent research shows that foamed detergents can clean far more efficiently than non-foamed ones. Not only do they reduce the amount of detergents by up to 90%, but they also generate additional physical cleaning mechanisms which await to be understood and exploited. In particular, the processes acting at the contact zone between the aqueous foam and the non-aqueous “dirt” must be clarified. In a collaboration with the “Bavarian Administration of State-Owned Palaces, Gardens and Lakes”, the University of Cologne, the Institut Charles Sadron in Strasbourg and the University of Stuttgart, we work on understanding the different mechanisms involved in foam-based cleaning, and to exploit this understanding to develop innovative cleaning methods. Our current understanding of and progress on the subject will be presented, including the surprising observation that unstable foams clean better than stable foams: **Less is More!!!**



Cleaning historical objects with foam.

Less is More: Unstable Foams clean better than Stable Foams, T. Schad, N. Preisig, D. Blunk, H. Piening, W. Drenckhan, C. Stubenrauch, *JCIS*, **2021**, 590, 311-320

Foam-Based Cleaning of Surfaces Contaminated with Mixtures of Oil and Soot, T. Schad, N. Preisig, W. Drenckhan, C. Stubenrauch, *J Surfact Deterg.*, **2022**, 25, 377-385

Innovative Foam-based Cleaning Concepts for Historical Objects, T. Schad, N. Preisig, H. Piening, C. Stubenrauch, *Tenside Surf. Det.*, **2022**, 59, 451-459