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Bubbles with Great Potential!
Molecular Control of Foam Properties

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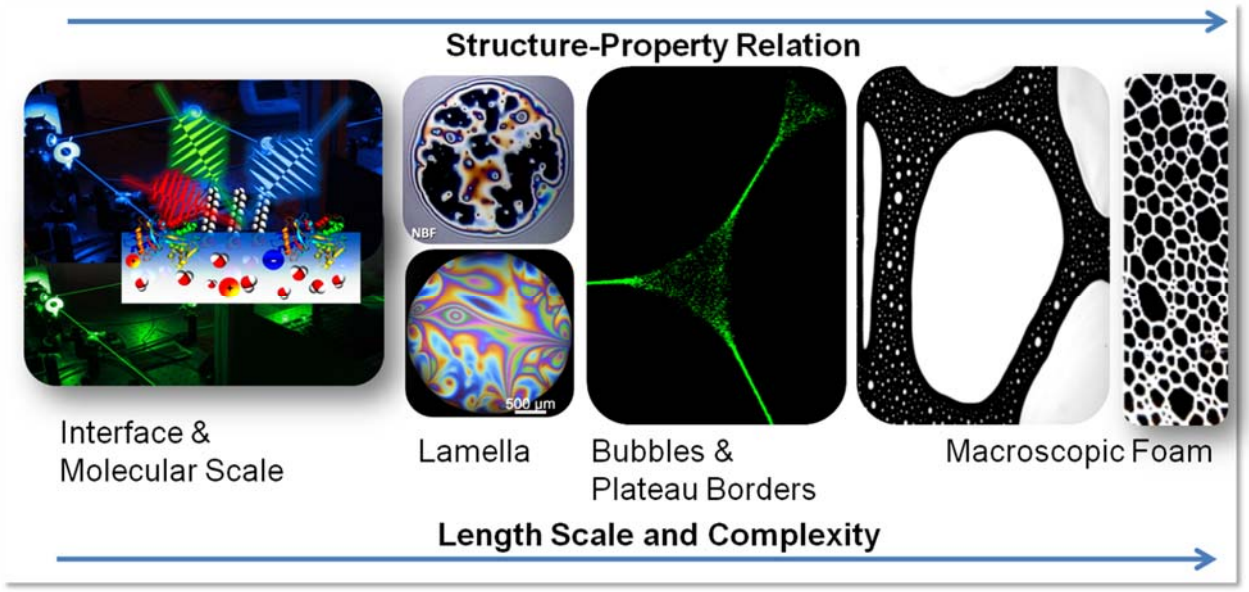

Foams find many applications from heat insulation, dairy product to advanced materials of low weight and with tunable viscoelastic properties. In general, the question arises how foam properties can be made better or how new material properties and processes can be generated. This question directly relates to the process chain from foam generation to the desired final application where the process parameters or in general process engineering aspects need to be considered. In addition, it is shown that also the intrinsic properties of individual molecular building blocks at the ubiquitous gas/liquid interfaces inside macroscopic foam can have overwhelming importance. This is due to the hierarchical structure of foams which are inherently interface-controlled materials. In fact, it can be shown that foams follow well-defined structure-property relations where the individual molecular building blocks act at the microscopic scale of the gas/liquid interface but control macroscopic properties such as foam stability, rheology or foam structure.
In order to reveal structure-property relations inside foam, we perform experiments on hierarchical elements at several length scales and address the interfacial molecular and lateral interactions with nonlinear optical spectroscopy and classical methods such as tensiometry, surface dilatational rheology and foam analysis.

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