Project LiNaBioFluid

Deliverable 3.2: Images of first results of lizard-like surface morphologies

Reporting period	from	**01.07.2015**	to	**30.06.2016**
Report completed and released		**28.06.2016**		

1. Objectives and Detailed Description

The objective of D3.2 was a public report on the subject of task 3.1 in which systematic laser irradiation experiments on flat samples have been performed. These studies have been carried out systematically on different sample materials such as steel to find optimal laser processing parameters for mimicking the topography found on the lizard skin.

In this context, the aim of Delivery D3.2 was to publish SEM images of the topographies on the "LiNaBioFluid" website (www.laserbiofluid.eu) to present some of the results to the public. To compare natural model and abstracted surface structures on technical surfaces, images of both topographies had to be included.

Deliverable D3.2 complemented deliverable D3.3 in which results of the laser structuring and the corresponding wetting properties were published in more detail.

2. Evaluation of Goals and Resulting Actions

The images of D3.2 have been published successfully on the LiNaBioFluid website in combination with a short explanation. In **Figure 1**, the published images are shown. SEM images of the lizard integument as biological model are presented on the left ((a), (c)) and SEM as well as microscope images of the laser processed steel material (case-hardened 16MnCr5, 1.7131) ((b), (d)) are presented on the right.
As shown in publication D3.3, two different laser processing approaches are presented to mimic topographical features of the lizard skin. For example, the hydrophobic spike structure found on Yarrow's spiky lizard *Sceloporus jarrovii* was successfully mimicked by laser-induced self-organization ((b)). The shapes of natural and fabricated topography look quite similar. Another feature, which is found on the skin of the moisture-harvesting lizard *Phrynosoma platyrhinos*, is a capillary channel network with a superimposed micro-dimple array. This surface structure results in hydrophilic properties and was abstracted and fabricated by direct laser structuring. Building upon a basic channel network inducing directional fluid transport, a hexagonal micro-dimple pattern was superimposed to the capillary structure. The micro-dimples were in the same order of magnitude as the natural model and resulted in significantly improved wetting properties. Hence, it could be shown that the directional fluid transport in surface capillary channels can be further optimized using a hierarchical surface structure.

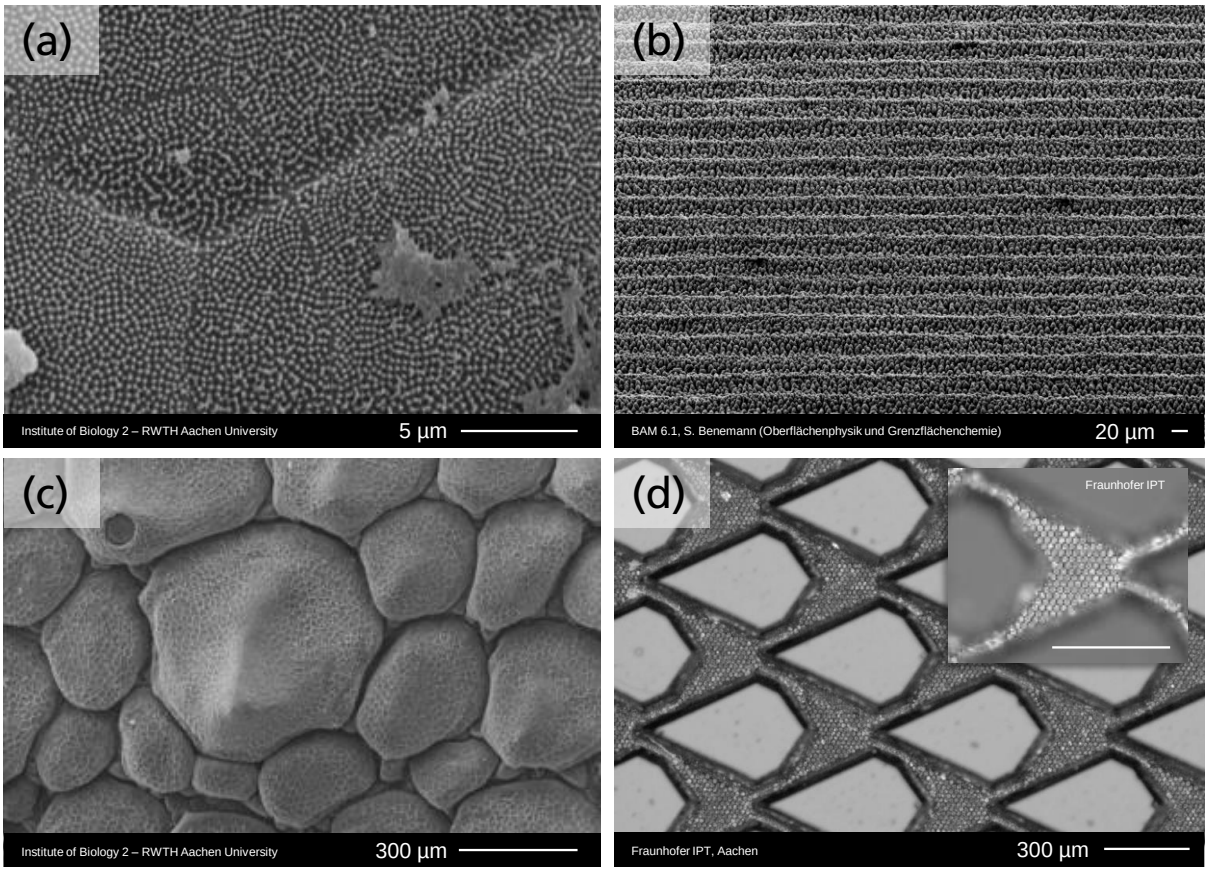

Figure 1 (a) SEM image of the integument of Yarrow's spiky lizard *Sceloporus jarovii.* (b) Laser-induced self-organized nanostructures mimic the topography of (a). (c) SEM image of the integument of the moisture-harvesting lizard *Phrynosoma platyrhinos*. (d) Capillary structures with superimposed micro-dimple array manufactured by direct laser ablation mimic the topography of (c). The inset highlights the micro-dimples inside the capillaries.