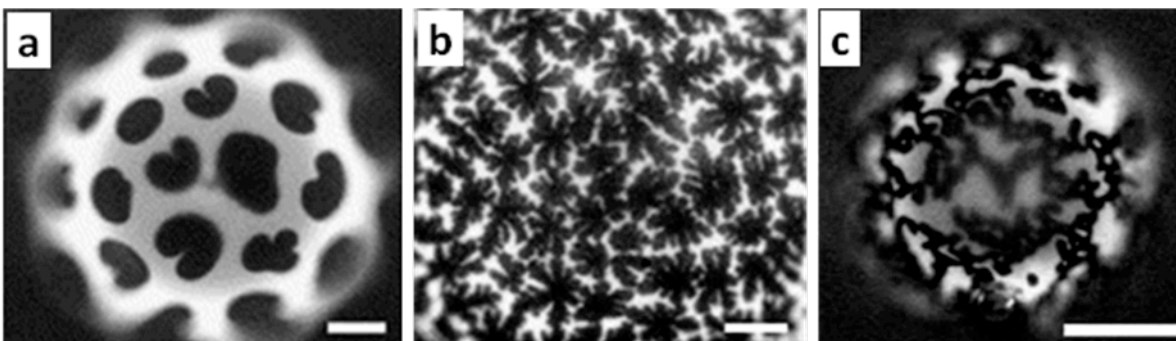


## Lipid-Coated Microbubbles: fundamentals and biomedical applications.

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Lipid-coated microbubbles are finding increasing use in ultrasound imaging, targeted therapy and gas exchange. Results indicate that the lipid forms a monolayer around the gas core and stabilizes the interface against Laplace-pressure driven compression. While the shell has historically been depicted as a uniform film, recent microscopy evidence has revealed a rich and complex structure. Nanostructural features have been observed, including polygons, snowflake dendrites and networks. Lateral phase separation and interfacial partitioning may occur. Of current research interest is how these nanostructural features form, and how they may affect the dynamic properties of the microbubble. Two examples of engineering the microbubble shell will be presented. In the first example, a bimodal brush architecture is used to provide ultrasound-triggered control of microbubble adhesiveness to a target cell. In the second example, a layer-by-layer assembly scheme is used to form microbubbles with tenfold higher DNA loading capacity than previously achieved. These applications highlight the importance of gaining a more fundamental understanding of basic physicochemical properties for lipid-coated microbubbles, in order to expand their use to new applications.



Domain morphologies on lipid-coated microbubbles observed by fluorescence microscopy.