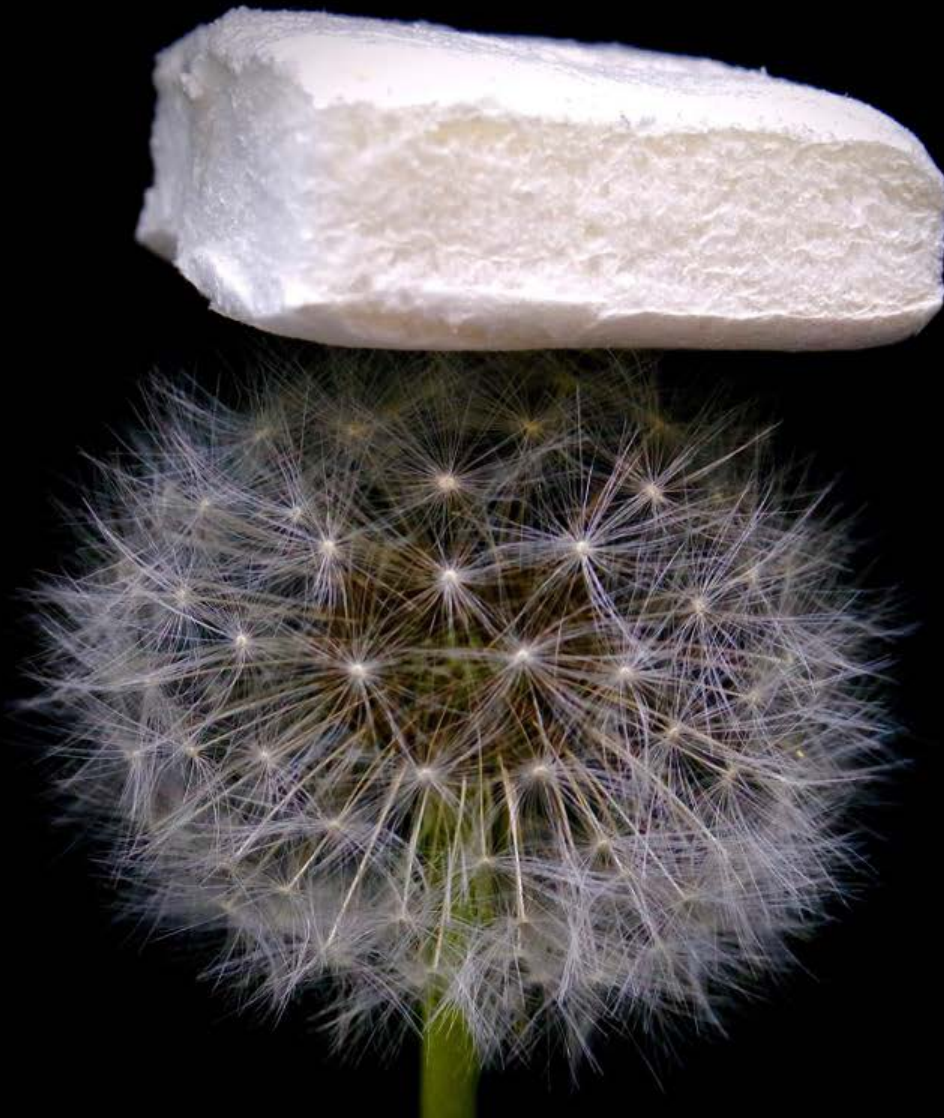


Ultraleichte, nanofaser-basierte Aerogele als Hochleistungsfilter

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zh
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- Aufgabe: Ein verbesserter Atemschutzfilter



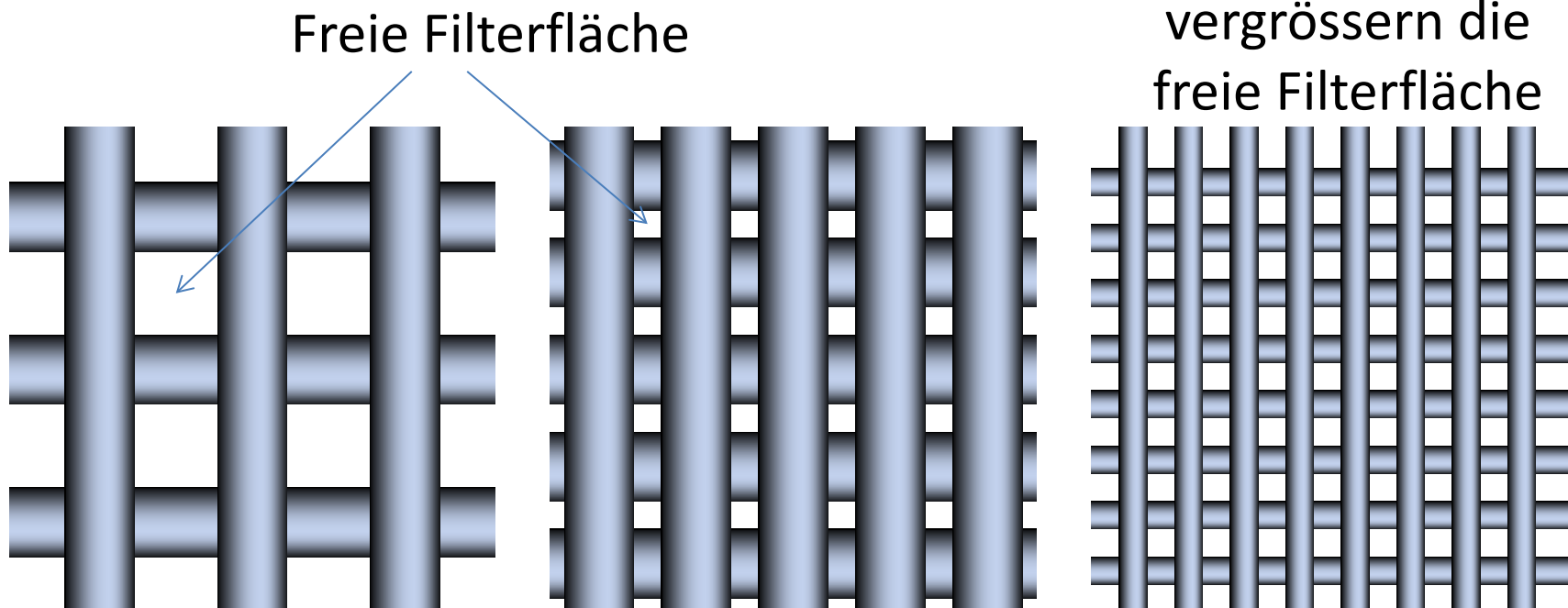
Abb.: tbSafety

Die Quadratur des Kreises:

- Grösserer Luftdurchlass => grössere Poren
- Bessere Abscheideeffizienz => kleinere Poren

Die Idee: Dünnere Fasern

- Kleine Löcher reduzieren die freie Filterfläche

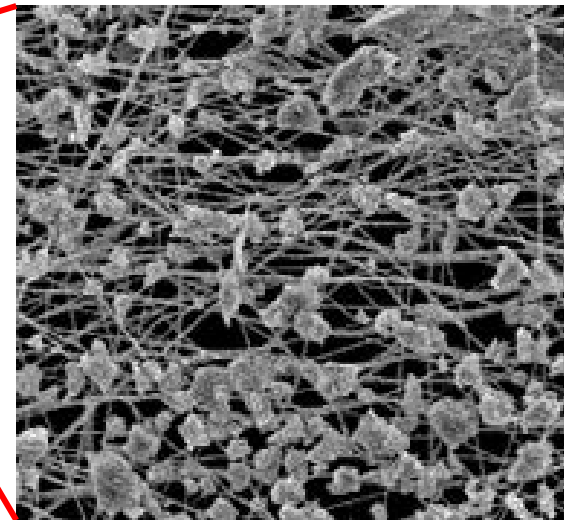


Die Lösung: Nanofasern?

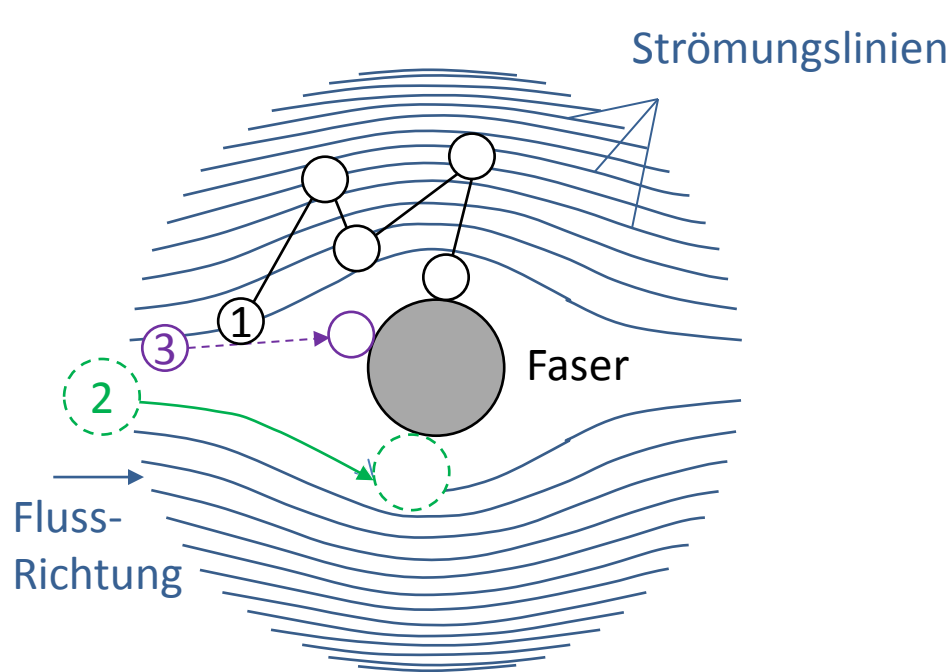
- 100 mal dünner als das menschliche Haar



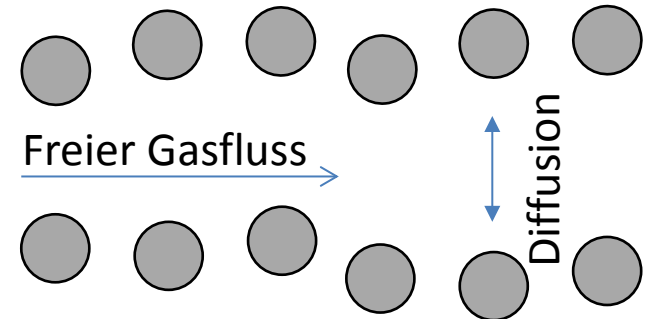
Effiziente
Partikelabscheidung auf
Nanofaserfiltern



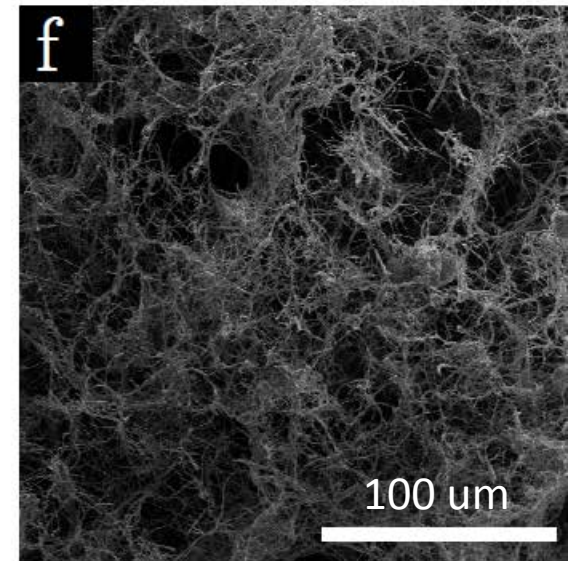
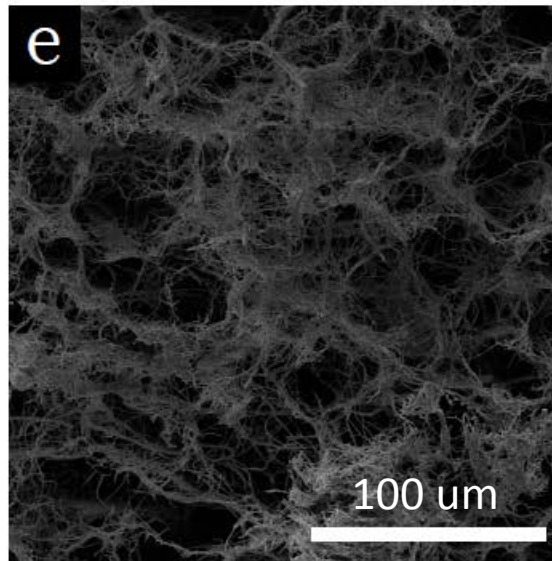
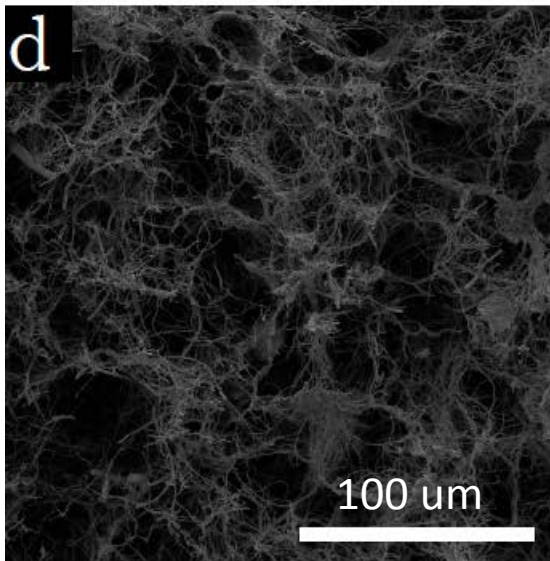
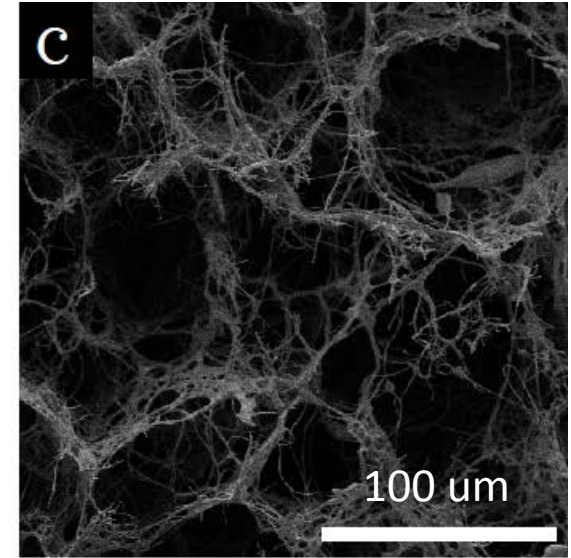
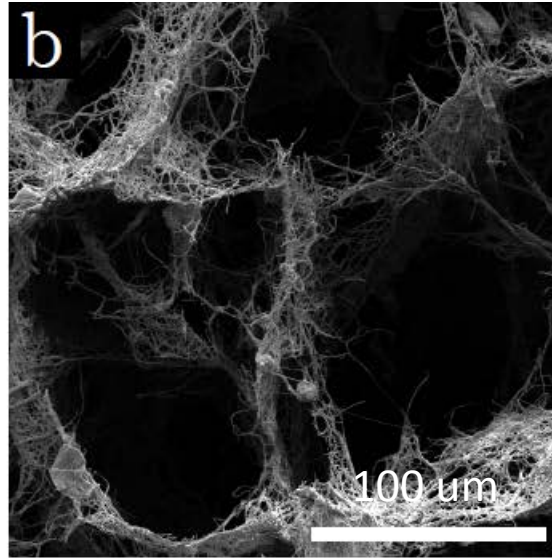
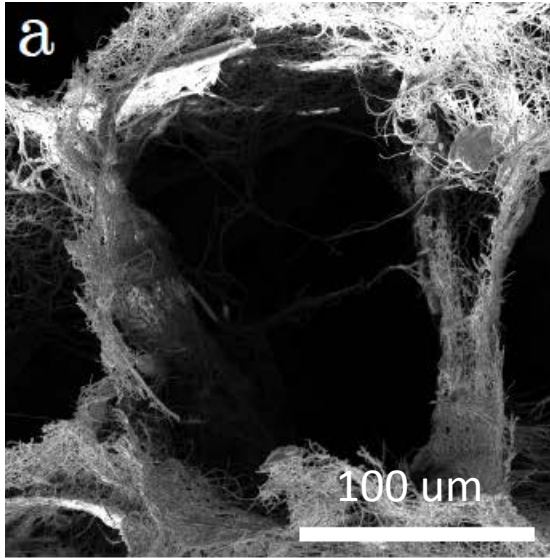
- Partikelabscheidung an einer Faser

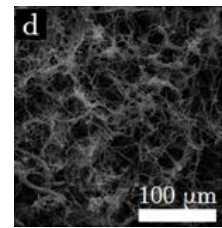
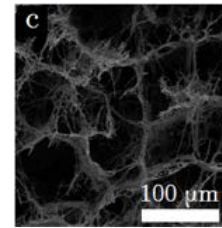
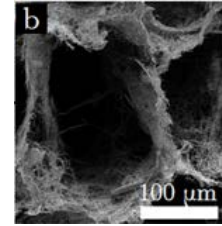
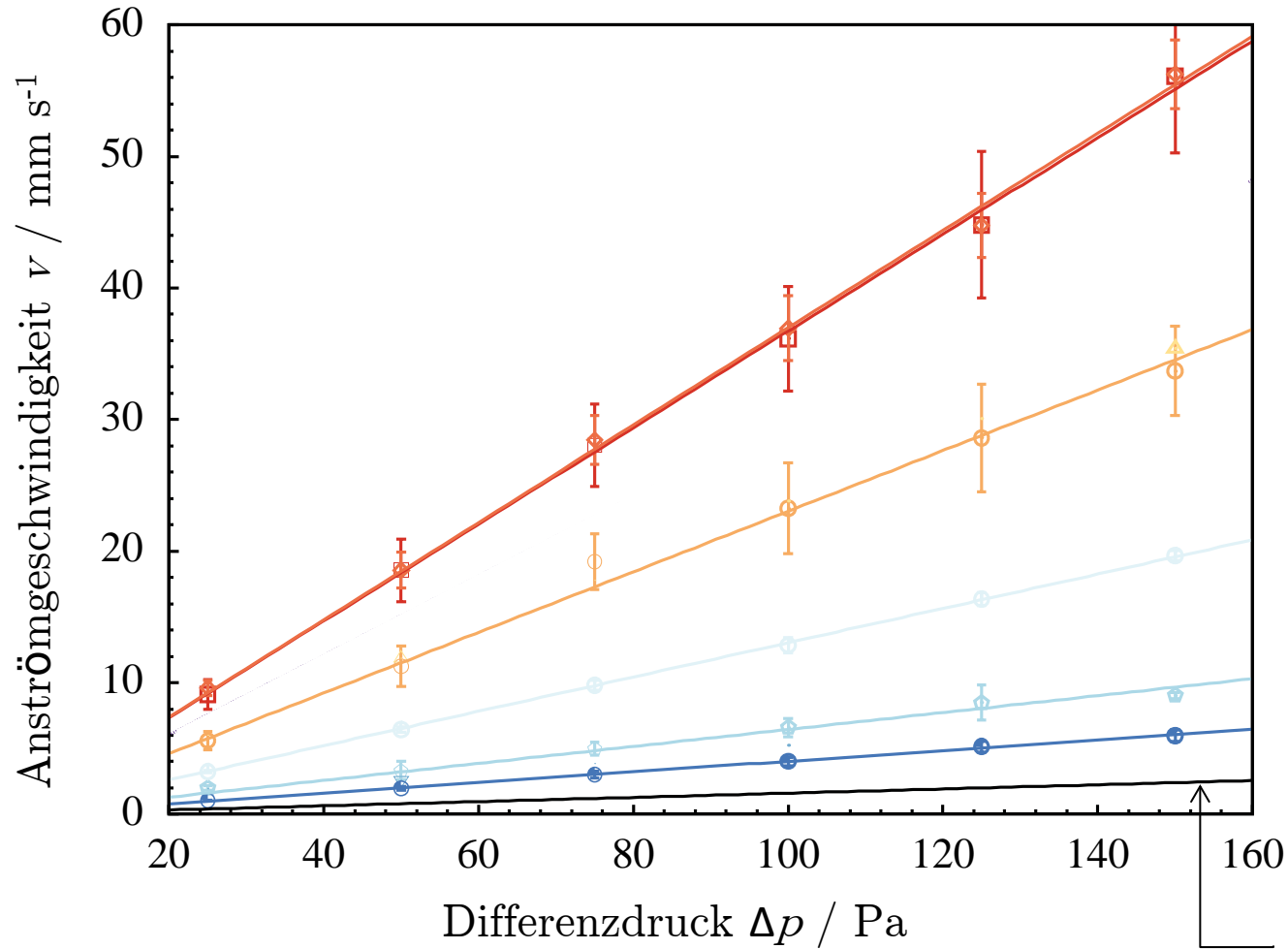


3D-Tiefenfilter statt Siebfilter



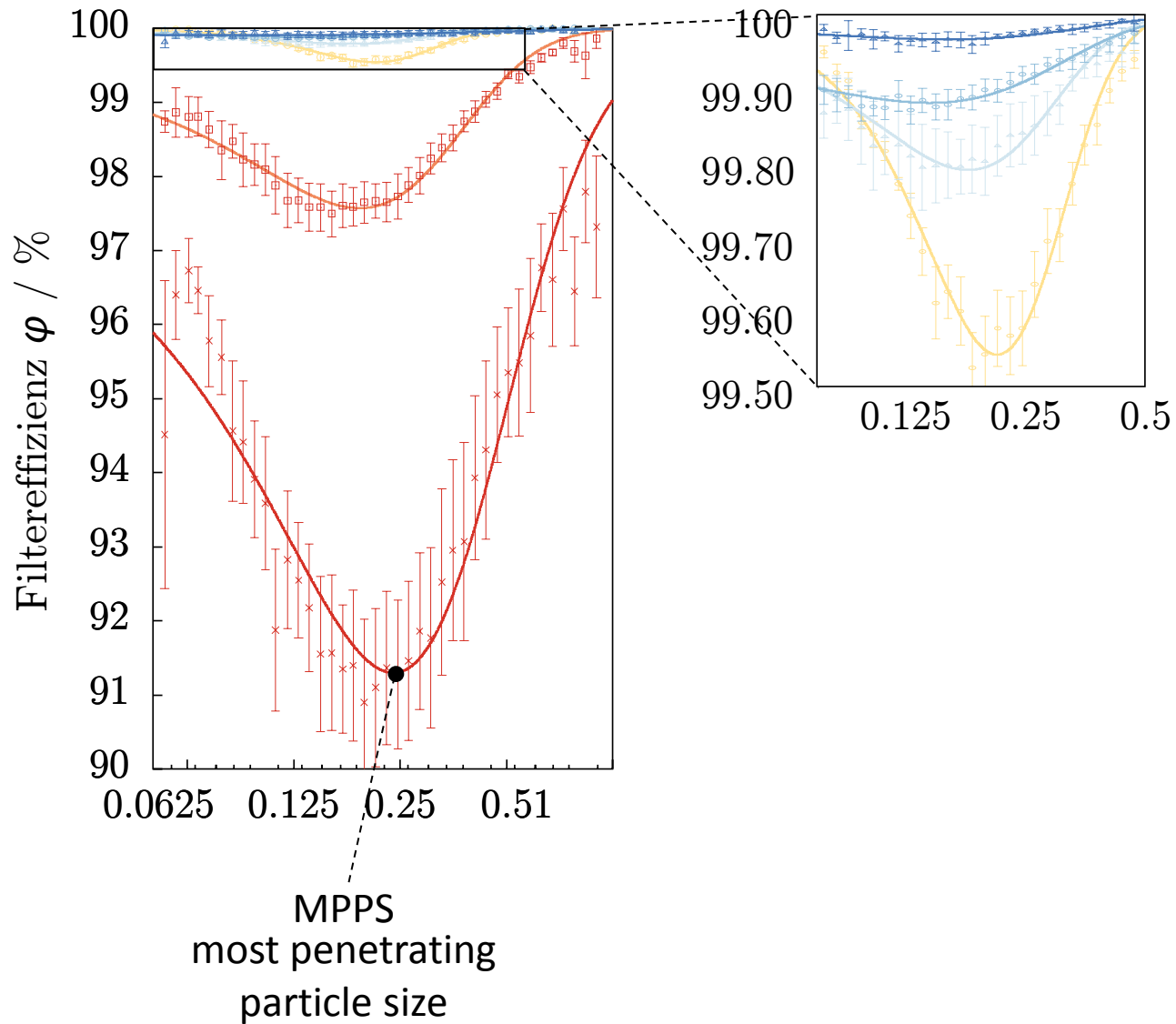
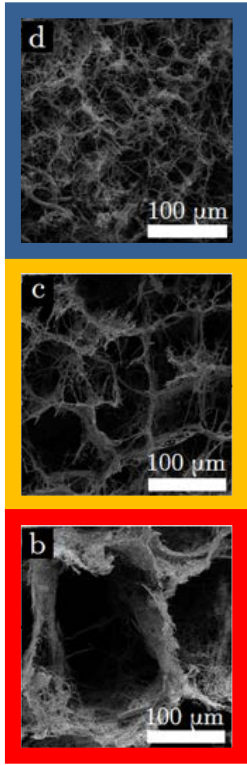
Hierarchische Mikrostruktur von Nanofiber Aerogelen

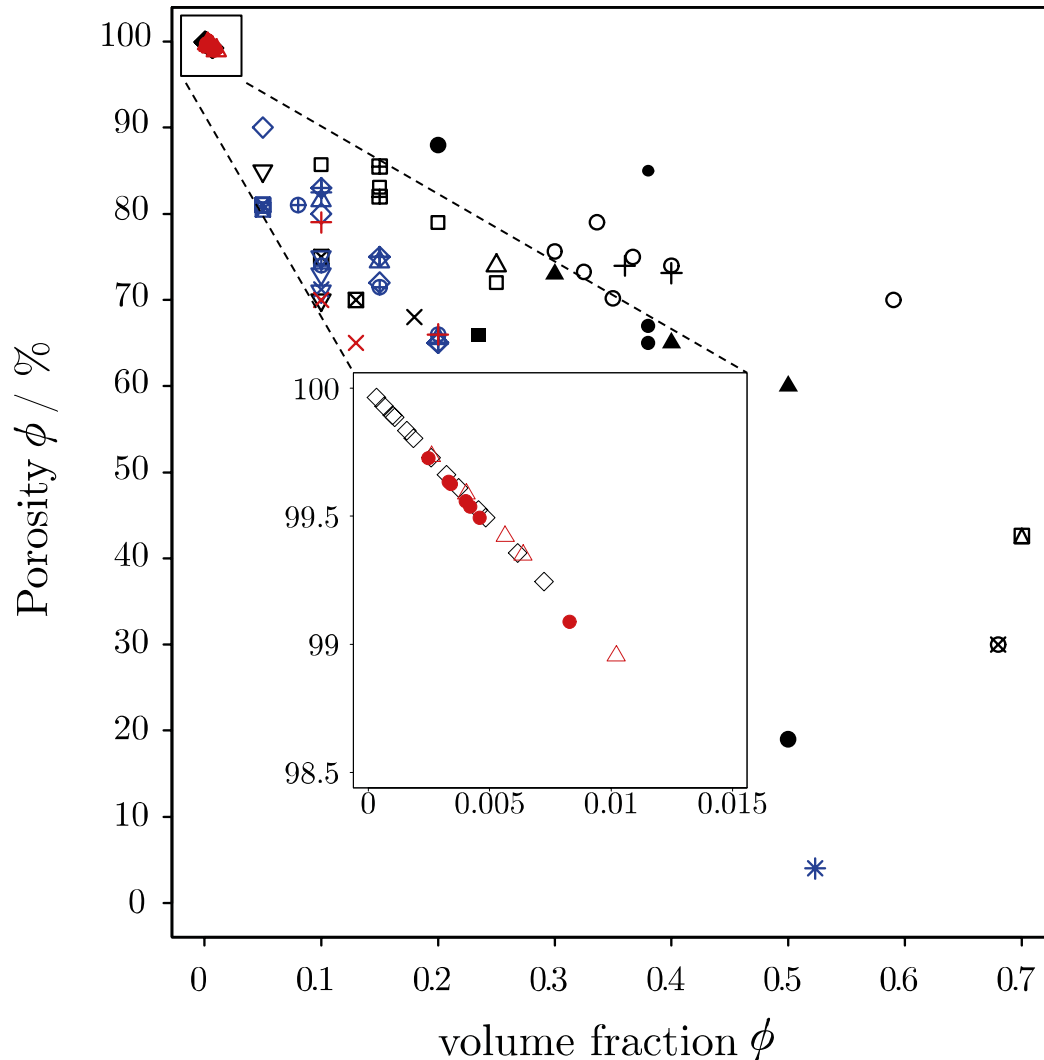




nanofiber membrane

Filtereffizienz @ 6 cm s⁻¹





◇ Ding (2014)

● Greiner (2015)

△ ZHAW

[1] Y. Si, J. Yu, X. Tang, J. Ge, B. Ding, "Ultralight nanofibre-assembled cellular **aerogels** with super elasticity and multifunctionality" *Nat. Comms.*, 5 (2014), 5802-5811

[2] G. Duan, S. Jiang, V. Jérôme, J. H. Wendorff, A. Fathi, J. Uhm, V. Altstädt, M. Herling, J. Brey, R. Freitag, S.

Agarwal, A. Greiner, "Ultralight, soft polymer **sponges** by self-assembly of Short Electrospun Fibers in Colloidal Dispersions", *Adv. Funct. Mater.*, 25 (2015), 2850-2856.

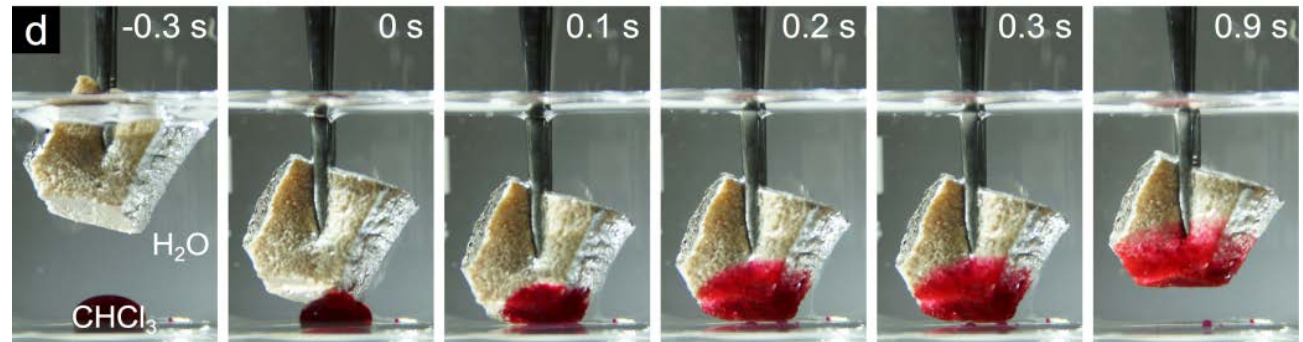
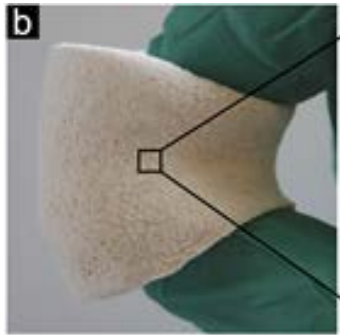
[3] F. Deuber, S. Mousavi, M. Hofer, C. Adlhart "Tailoring pore structure of ultralight electrospun sponges by solid templating", *ChemistrySelect*, 1 (2016) 5595-5598

[4] F. Deuber, C. Adlhart "From Short Electrospun Nanofibers to Ultralight Aerogels with Tunable Pore Structure", *Chimia* (2017) *in press*.

[5] F. Deuber, S. Mousavi, L. Federer, C. Adlhart "Amphiphilic nanofiber based aerogels from electrospun biopolymers for selective liquid absorption", *submitted*.

[6] J. Ebert, N. Keel, C. Adlhart, T. Hofmann "Schutzanzug mit Luftfilter" (2016) EP 3 050 594 A1.

- Aus Nanofasern lassen sich ultraleichte hochporöse hochflexible Aerogele mit kontrollierter hierarchischer Porenstruktur und grosser innerer Oberfläche erzeugen



➤ Anwendungen

- Isolationsmaterial

- Schalldämmung

- Partikelfilter

- Träger für Katalysatoren

- Tissue Engineering

- Reinigung von Gewässern

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COST Action MP1206

Forschungsfond Aargau

HTZ Aargau