

Tyvek studies at BUW

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- Aging of tyvek
- Step in aging due to freezing
- Absolute wave-length dependend reflectivity
- Diffuse vs. speciular reflectivity
- Reflectivity in Water
- Additional measurements by Sven
- Tyvek sample from the field, and unsued sample



Documentation:

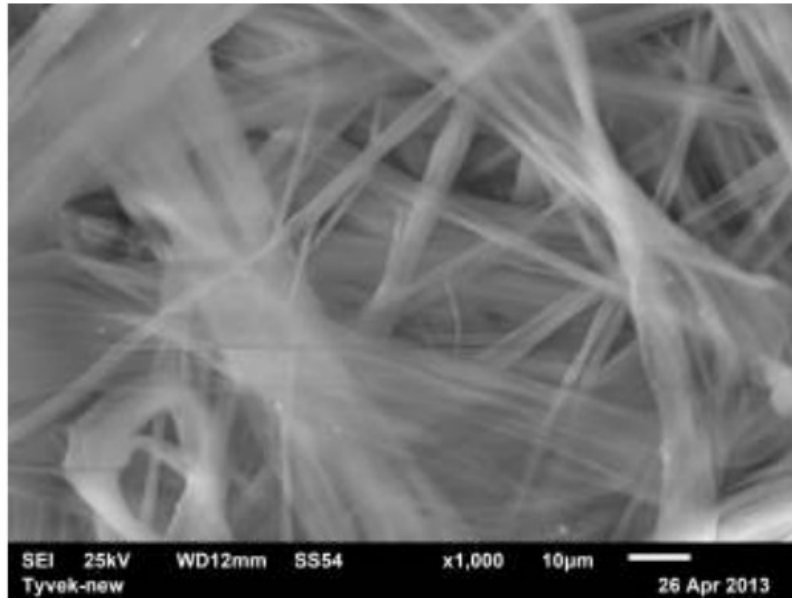
- Bac. Thesis of Alex Käätä, not as gap, only thesis:

<https://astro.uni-wuppertal.de/fileadmin/physik/astro/mainpage/publications/theses/Bachelor/Kaeaepae-BSc.pdf>

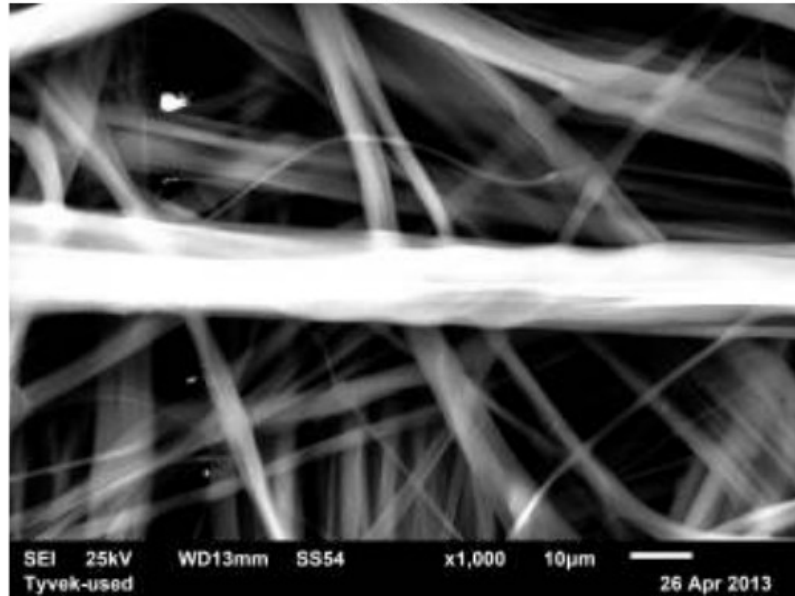
- Presentations at collab meetings:

- Nov. 2013 <https://indico.nucleares.unam.mx/event/782/session/10/contribution/118>

new



used



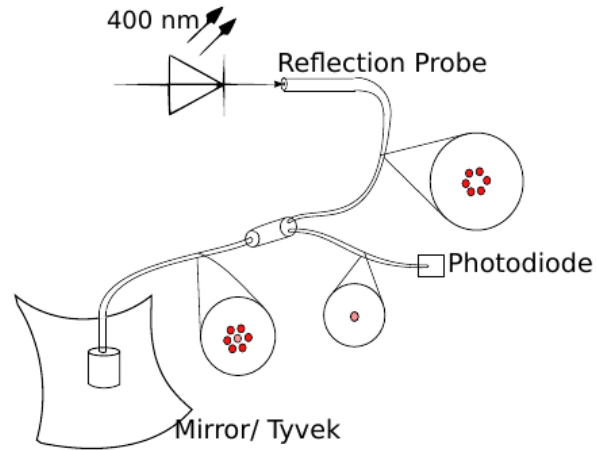
SEM scan of samples (as in GAP-2004-056 for damaged Tyvek):

- no obvious difference between new and used Tyvek samples
 - ▶ no cuts or broken/damaged stings
- no contamination of used probe

→ lower reflectivity just caused by smaller density?

Specular Reflectivity Measurement

- **Experimental setup**



- reflection probe: 6 fibers from 400 nm LED to sample, one fiber ($\varnothing 400\mu\text{m}$) back to photodiode
- signal of used (Old) and unused (New) Tyvek measured in air and deionized water (sample size $\sim 5\text{ cm} \times 5\text{ cm}$)
- averaged over 30 positions to account for inhomogeneity

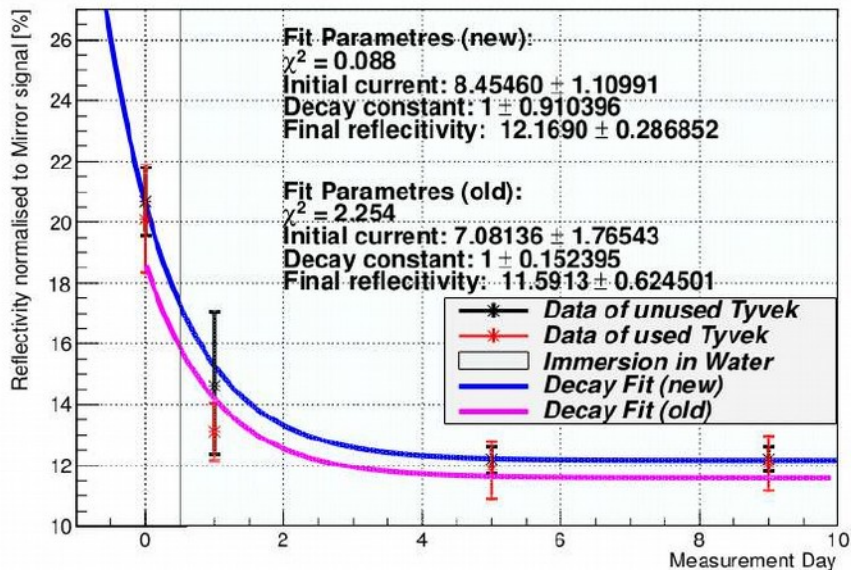
Specular Reflectivity Measurement

Since „recovery“ after water refill observed in the pampa, measurement vs. time in water

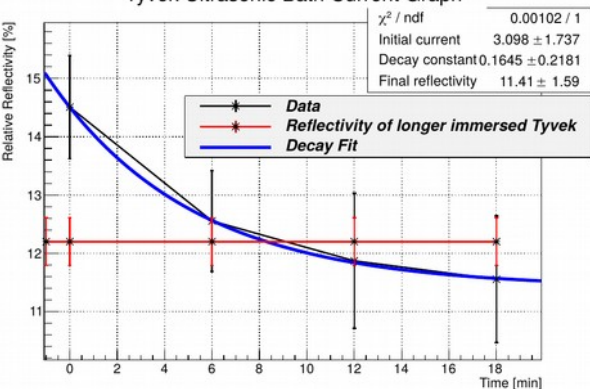
Indication of decrease with time in water

To test bubble-hypothesis: use ultrasonic bath, but seems to destroy the tyvek structure

Tyvek New (Black) and Old (Red) Graph



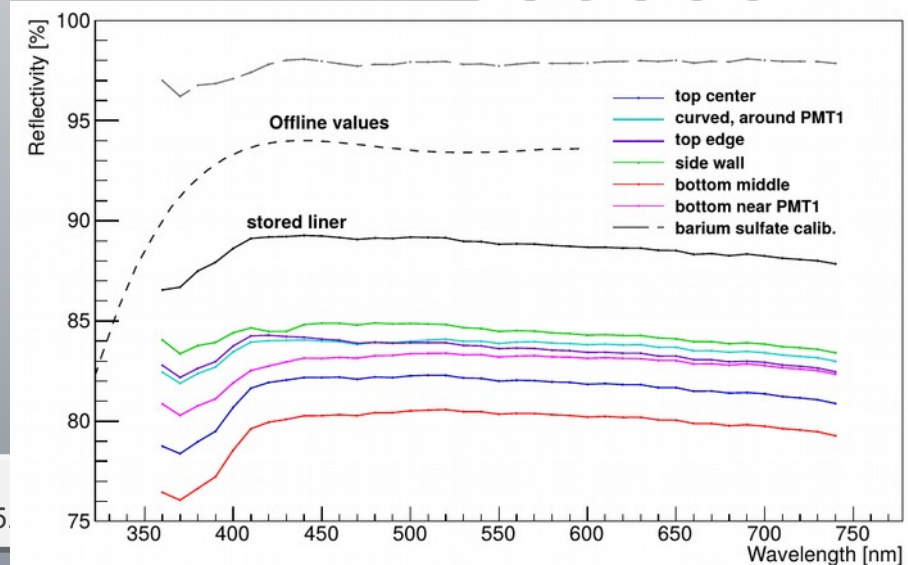
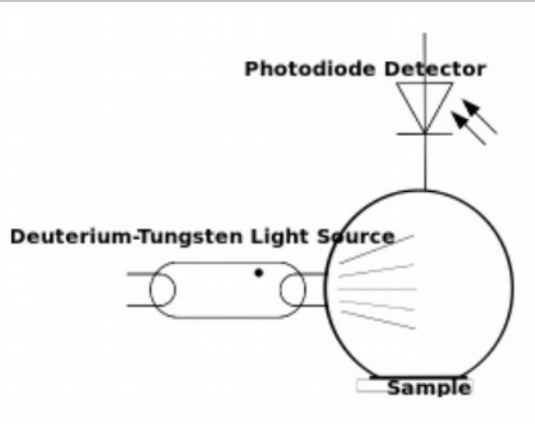
Tyvek Ultrasonic Bath Current Graph



- time depended measurement (1, 5 and 9 days after immersion)
- further decrease of reflectivity in water
- saturation for both samples after several days (caused by nano bubbles?)
- deviation for new sample drops significantly

Diffuse reflectivity measurements

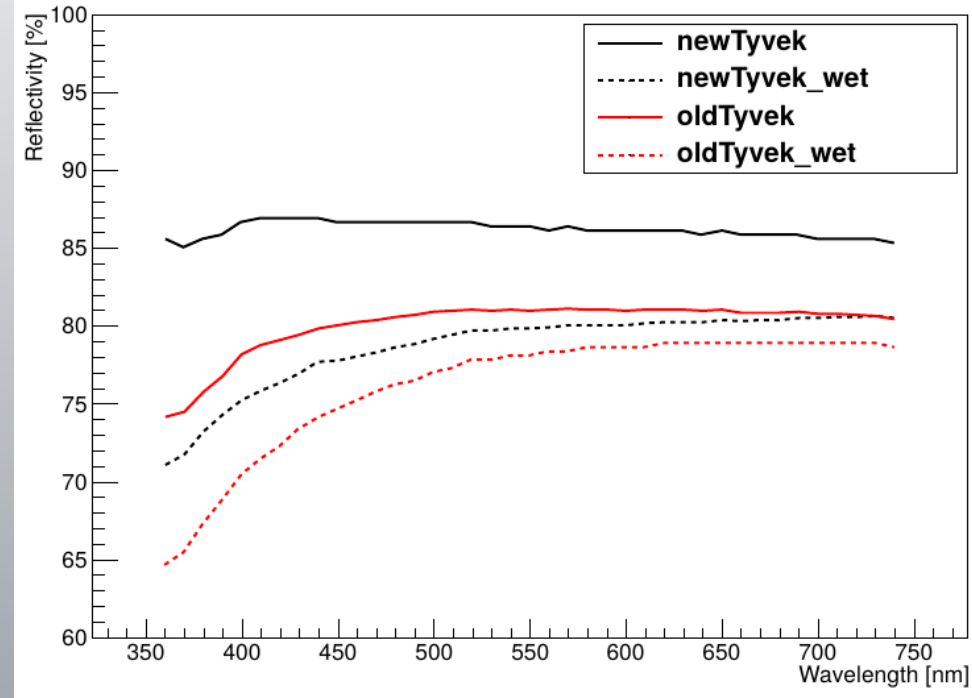
- measurement of diffuse reflectivity in air and water with small integrating sphere
- air: consistently lower reflectivity for used sample
- water: diffuse reflectivity measured with 405 nm laser diode used Tyvek ~3% lower than new sample (~same as for specular meas.)



Additional diffuse measurement

spectrometer measurement for new and old Tyvek and two samples after used in water (but already dried for several days)

shape changes slightly after used in water (see also page 9)





- two Tyvek samples from the same roll; one frozen in water and one in air down to the same temperature
- reheated samples measured in air
- no significant difference in reflectivity measured; the changes are well within margin of error