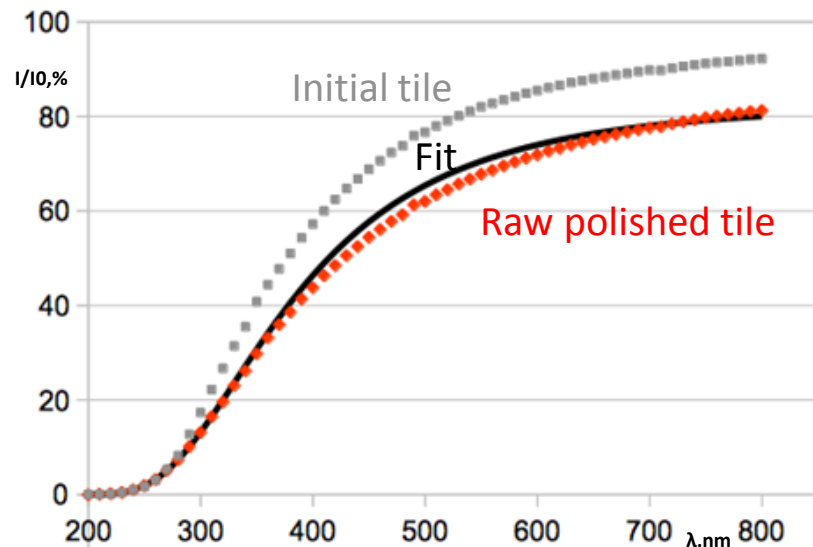
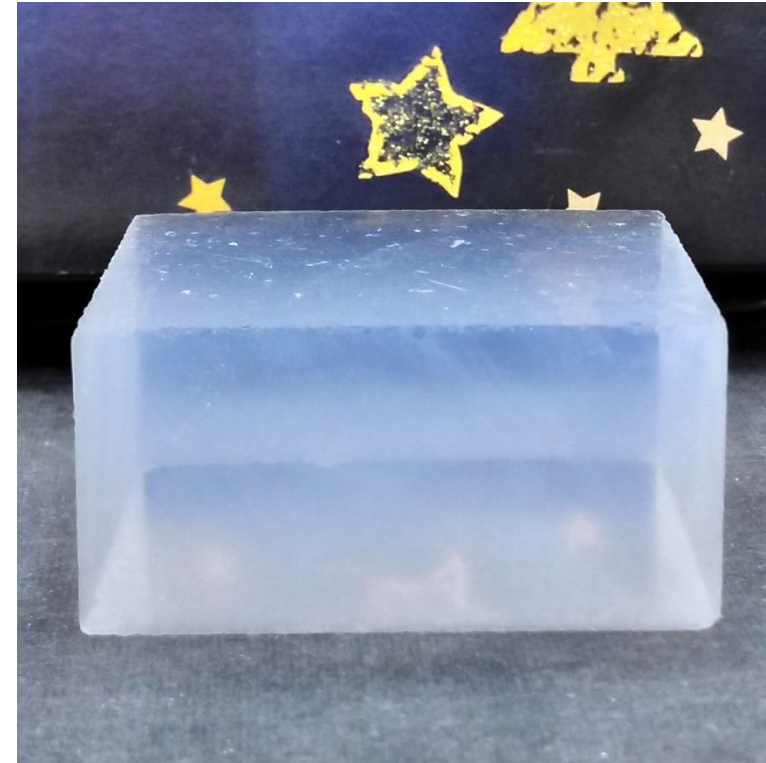


Impact of polishing on the light scattering at aerogel surface

presented by E.A.Kravchenko on behalf of Novosibirsk Aerogel Group



- Particle identification power of modern aerogel RICH detectors strongly depends on optical quality of radiators. The development of multilayer focusing aerogel radiators for RICH detectors requires to have flat optical clean entrance and exit surfaces.
- The main aim of this research was the search for a polishing method of aerogel. The current technology of aerogel synthesis used in the Boreskov Institute of Catalysis in Novosibirsk can not produce aerogel tiles with optical clean, flat bottom surface.
- We try to find some quantitative method of characterizing the light scattering on the surface. The well known Hunt formula does not describe well the transparency of polished tiles.

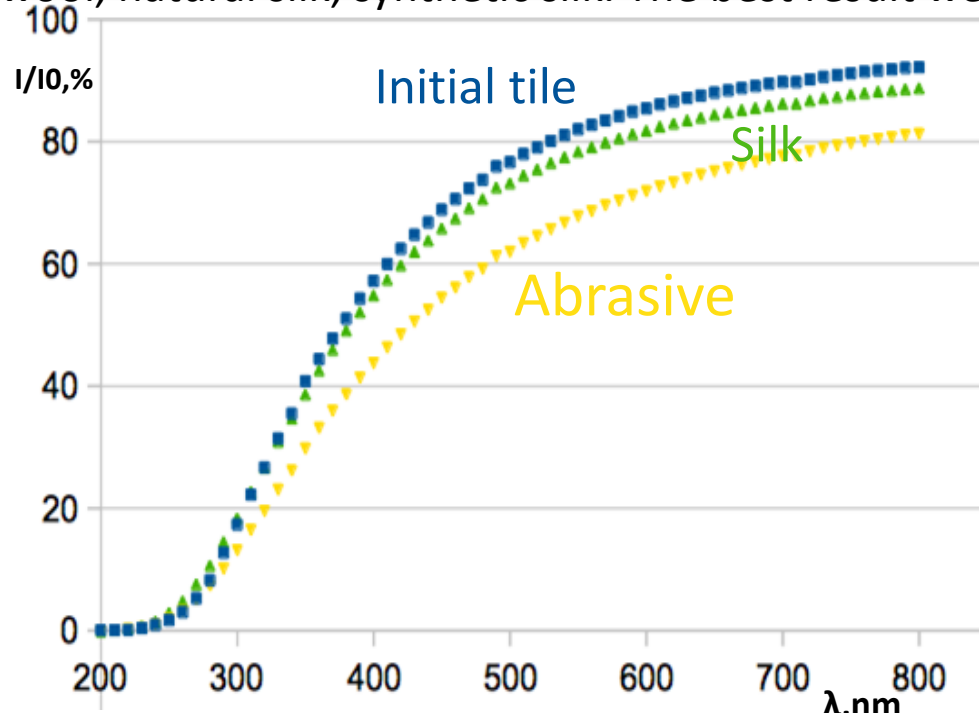
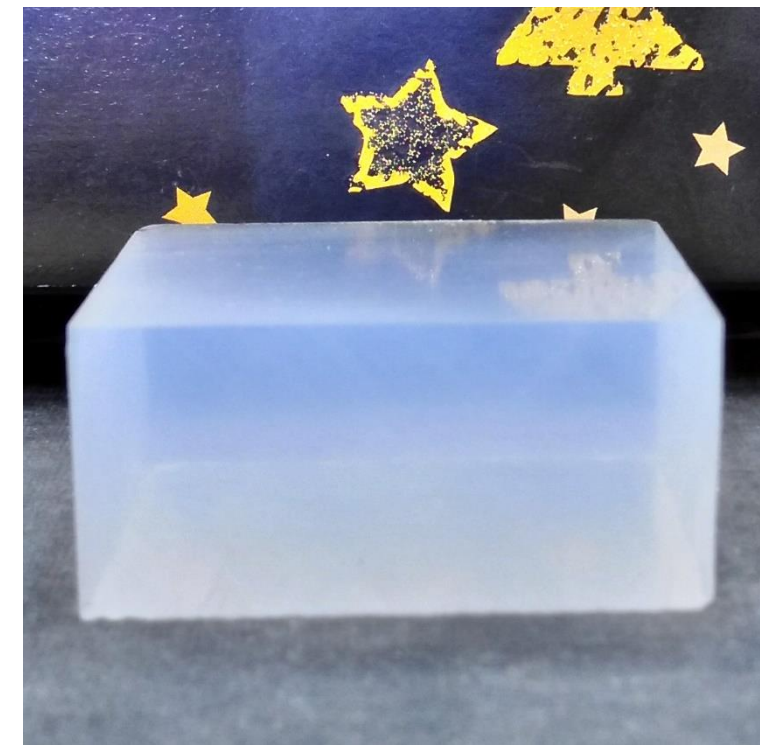


$$\frac{I}{I_0} = A \cdot \exp\left(-\left(\frac{t}{L_{sc} \left(\frac{\lambda}{400}\right)^4}\right)\right)$$

- The Hunt formula has been modified to describe scattering in a thin layer of silica dust on the surface of aerogel tile. An additional term with inverse square dependence on the wavelength was added:

$$\frac{I}{I_0} = A \cdot \exp\left(-\left(\frac{t}{L_{sc} \left(\frac{\lambda}{400}\right)^4} - \frac{M}{\left(\frac{\lambda}{400}\right)^2}\right)\right)$$

- The subsequent tests show that M and A coefficients describe well the quality of polishing. L_{sc} from the fit does not differ significantly after different polishing procedures.
- Different polishing tests with a fine abrasive paper did not give positive results. We decided to use for polishing some pore material – tissue. We try several tissues: wool, natural silk, synthetic silk. The best result we have got with natural silk.



	Initial tile	Abrasive	Silk
$A, \%$	94.9 ± 0.8	91.2 ± 1.7	92.4 ± 1.2
L_{sc}	51.3 ± 0.9	56.8 ± 2.2	50.3 ± 1.5
M	0.01 ± 0.01	0.36 ± 0.03	0.05 ± 0.02

We have succeeded to obtain aerogel tiles with optical smooth surfaces by polishing with the silk tissue. The measured decrease of aerogel transparency due to surface scattering is about few percent.