Removing cationic dyes from wastewaters using 3 Dimentional bio- based nanofiber aerogel

S. Mousavi[1], C. Adlhart[1]*

[1]Zurich University of Applied Sciences (ZHAW)

Nowadays, the chemical contamination of water from a wide range of chemical derivatives makes serious environmental issues. Synthetic dyes as one of the widely- used group of chemicals in various kinds of textile, paper, cosmetics and printing industries possess a significant source of pollution. Due to the high amount of color discharge in wastewater, their UV and temperature stability together with their inhibiting effects on photosynthetic activities, dye removing is essential.

Adsorption as a cost effective, easy and flexible method without any new toxic by- products is one of the best dye removing method. To overcome the difficulties such as following adsorbent separation processes beside the low efficiency of adsorbents, new promising electrospun nanofiber membranes are introduced.

Although electrospun nanofiber membranes have outstanding properties such as huge specific surface area, tailored surface functionality and fiber uniformity, they are still facing challenges such as low mechanical stability as well as unfavorable mass transport properties.

The new synthesized robust 3D aerogel, produced from short electrospun nanofiber dispersion using freeze casting method and crosslinking, has outstanding properties such as high porosity, mechanical stability, and flexibility as well as low density. The pore size of the sponge is tunable [1] and control of surface chemistry and surface properties is possible according to our previous works [2].

In this study, the pullulan based super elastic and environmentally friendly aerogel is used as a highly efficient dye adsorbent with outstanding regenerability. Effects of different parameters on batch and continuous experiments have been investigated. The adsorption process follow the Longmuir isotherm and pseudo second order kinetics is the best fit model.

[1] Fabian Deuber, Sara Mousavi, Marco Hofer, Christian Adlhart, *Chemistry Select*, **2016**, 1(18), 5595.
[2] Fabian Deuber, Sara Mousavi, Lukas Federer, Christian Adlhart, *Advanced Material Interface*, **2017**, 1700065