Assessing in situ Remediation Efficacy of Advanced Aerogel Adsorbent by Using Model Aquatic Culture of *Paramecium caudatum* Exposed to Hg(II)

Petra Herman[1,2,*], Alexandra Kiss[3], Gábor Nagy[3], István Fábián[1], József Kalmár[1]

[1]*Department of Inorganic and Analytical Chemistry, University of Debrecen, Egyetem tér 1, Debrecen, H-4032 Hungary*

[2]*Doctoral School of Chemistry, University of Debrecen, Egyetem tér 1, Debrecen, H-4032 Hungary*

[3]*Department of Molecular Biotechnology and Microbiology, University of Debrecen, Egyetem tér 1, Debrecen, H-4032 Hungary*

**Correspondence: herman.petra@science.unideb.hu*

Mercury is one of the most toxic heavy metals associated with serious health damage even at very low concentrations of exposure. Silica-gelatin aerogel of 24 wt% gelatin has excellent performance for the removal of aqueous Hg(II) under conditions of practical applications in environmental engineering. [1] The objective was to test its effectiveness by exposing *Paramecium* cultures to increasing concentrations of Hg(II) and using the adsorbent for in situ remediation. The cultures were continuously monitored by time lapse video microscopy imaging. The viability of paramecia was quantified by analyzing the pixel differences of the sequential images caused by the persistent movement of paramecia.

The viability of *Paramecium* displays a clear exposure-response relationship with Hg(II) concentration. Viability decreases with increasing Hg(II) concentration when the latter is higher than 125 μg L^{-1}. In the presence of 0.1 mg mL^{-1} aerogel adsorbent, the viability of the cells is low only at Hg(II) concentrations higher than 500 μg L^{-1}, and significant viability is measured even at 1000 μg L^{-1} Hg(II). The effective toxicity of Hg(II) is lower in the presence of the aerogel, because the equilibrium concentration of aqueous Hg(II) is low due to adsorption. [2]

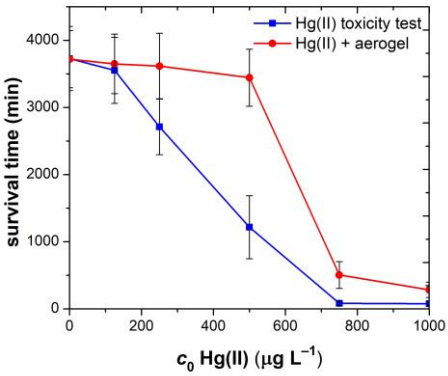

Figure 1: Survival time of *Paramecium* cells as function of aqueous Hg(II) concentration in the absence and in the presence of the aerogel adsorbent.

References:

1. P. Herman, I. Fábián, J. Kalmár, *ACS Appl. Nano Mat.* **3**, 195 (2020)
2. P. Herman, A. Kiss, I. Fábián, J. Kalmár, G. Nagy, *Chemosp.* (2021)