



**FILTRATION AND FLUIDIZATION RESEARCH CENTER (FFRC)  
AT MARMARA UNIVERSITY**

## **Research Activities**

### Deep-bed filtration:

The use of alternative filter media (e.g. crushed recycled glass)

Declining rate filtration (DRF)

Concepts of Filterability Index

Theories of filtration

### Liquid-solid fluidization:

Filter backwash hydraulics

Expansion of granular beds during fluidization

Mixing and inversion phenomena in liquid-solid fluidization

Particle characterization (granular media)

### Porous media hydraulics:

Models for head-loss prediction

Models for non-spherical, non-uniform media

Effect of shape for granular media used in water filtration

### Membrane Filtration

Nanoparticle Embedded Polymeric Membranes for Water and Wastewater Treatment

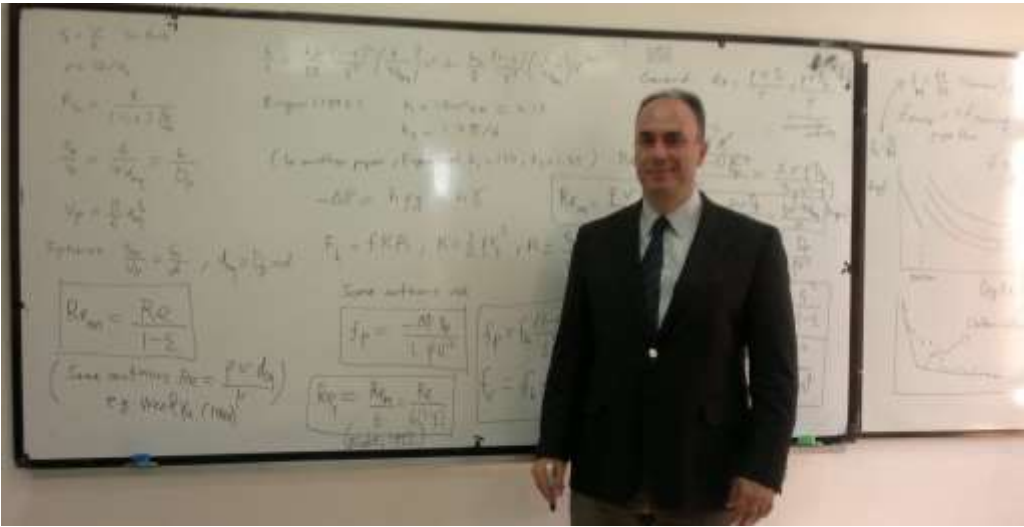
Silver Embedded Polymeric Membranes for Water Treatment

Mathematical models for membrane filtration

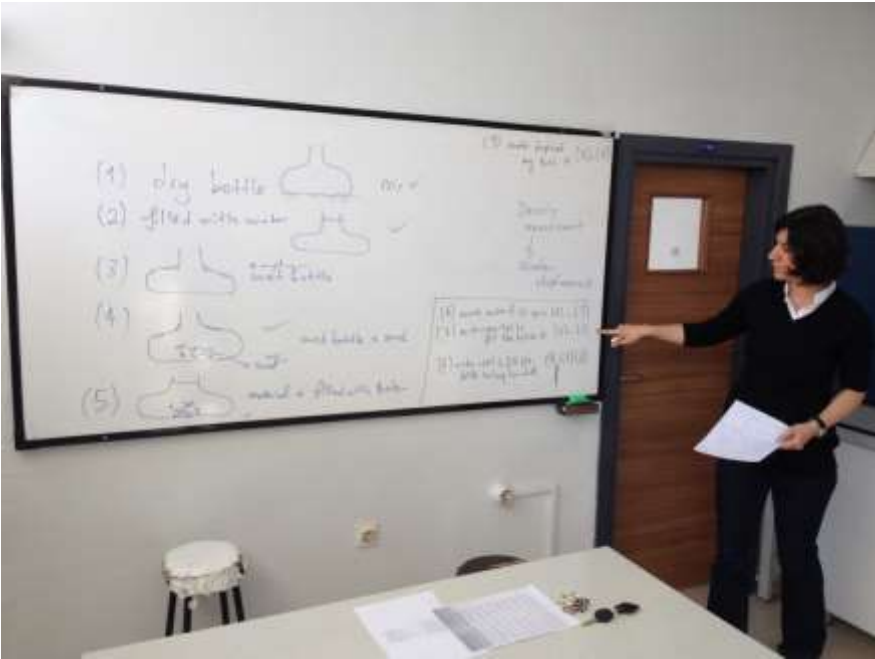
Membrane Biological Treatment (MBR)

# The Team

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## Collaborators at Other Institutions

**Ahmet Mete Saatçı** (Turkish Water Institute)



**Nursen Öz Eldem** (Istanbul Technical University)



**MATERIALS, EQUIPMENT AND FACILITIES**













## SELECTED PUBLICATIONS

- S.Y. Hunce, E. Soyer, Ö. Akgiray (2018). On the Backwash Expansion of Graded Filter Media. *Powder Technology* (in print).
- S.Y. Hunce, E. Soyer, Ö. Akgiray (2018). Use of filterability index in granular filtration: effect of filter medium type, size and shape. *Water Science & Technology: Water Supply* (in print).
- E. Soyer, S.Y. Hunce, Ö. Akgiray (2017). Characterization of apricot stone shells as a rapid filter medium. *Desalination and Water Treatment*. doi: 10.5004/dwt.2017.20823
- S.Y.Hunce, E.Soyer, Ö.Akgiray (2016). Characterization of granular materials with internal pores for hydraulic calculations involving fixed and fluidized Beds. *Industrial and Engineering Chemistry Research*.
- E Erdim, Ö. Akgiray, İ Demir (2015). A revisit of pressure drop-flow rate correlations for packed beds of spheres. *Powder Technology* 283, 488–504.
- M. Eyvaz, Ö. Akgiray, E. Yüksel (2013). An experimental investigation on the hydraulic behavior of declining rate filtration. *Desalination and Water Treatment* 51, 6137–6147.
- E. Soyer, Ö. Akgiray, N. Ö. Eldem, A. M. Saatçı (2013). On the use of crushed recycled glass instead of silica sand in dual-media filters. *Clean – Soil, Air, Water* 41 (4), 325–33.
- E. Soyer, Ö. Akgiray, N. Ö. Eldem, A. M. Saatçı (2010). On the use of crushed recycled glass as a filter medium and comparison with silica sand. *Clean – Soil, Air, Water* 38 (10), 927–935.
- E. Soyer and Ö. Akgiray (2009). A New Simple Equation for the Prediction of Filter Expansion During Backwashing. *Journal of Water Supply: Research and Technology-Aqua* 58 (5): 336-345.
- Ö. Akgiray and E. Soyer (2006). An Evaluation of Expansion Equations for Fluidized Solid-Liquid Systems. *Journal of Water Supply: Research and Technology-Aqua*, 55 (7-8): 517-526.
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- S. Aksoğan, A. Baştürk, E. Yüksel, and Ö. Akgiray (2003). "The Use of Crushed Shells of Apricot Stones as the Upper layer in Dual Media Filters." *Water Science & Technology*, Vol:48, Issue:11-12.
- E. Yüksel, Ö. Akgiray, A. Saatçı, H. Sarıkaya, İ. Koyuncu (2002). "Effect of Ozone Injection Location on Filter Performance in Direct Filtration," *Water Science and Technology*, Vol:46, Issue:9.
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- Ö. Akgiray and A. M. Saatçı (1998). "A Critical Look At Declining Rate Filtration Design," *Water Science and Technology*, Vol:38, Issue:6, pp.89-96.
- Ö. Akgiray and A. M. Saatçı (1998). "An Algorithm for Bank Operation of Declining Rate Filters," *Water Research*, Vol:32, Issue: 7, pp. 2095-2105.
- Saatçı, A. M. (1990). "Application of Declining Filtration Rate Theory - Continuous Operation," *Journal of Environmental Engineering Division, American Society of Civil Engineers*, Vol. 116, No. 1, February, 1990, pp. 87-105.
- Saatçı, A. M. (1989). "Harmonic Mean Conductivity in Declining Rate Filters," *Journal of Environmental Engineering Division, American Society of Civil Engineers*, Vol. 115, No. 2, April 1989, pp. 462-466.

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- Cleasby, J. L., Ives, K. J., and Saatçı, A. M., Filtration in Water Treatment [In Turkish] ("İçme Suyu Tasfiyesinde Filtrasyon"), İstanbul Teknik Üniversitesi Matbaası, 1979.