



# FRITZ HABER SEMINAR ANNOUNCEMENT

Ben-Gurion University of the Negev

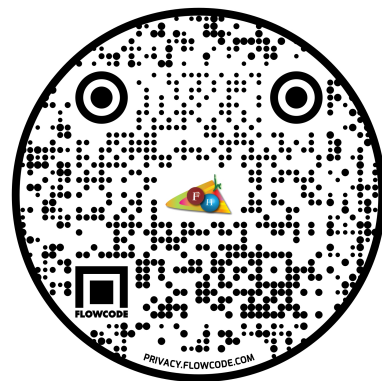
Prof. Yifat Miller

## Controlling self-assembly of amyloids and designed peptides

Thursday, December 10 2020

at 13:00 via Zoom:

<https://huji.zoom.us/j/9766578069>



# Abstract

The pathological self-assembly (or aggregation) of amyloid proteins into toxic aggregate species plays important role in amyloidogenic diseases, such as Alzheimer's disease (AD). One of the amyloids that have been implicated in the development of AD is amyloid  $\beta$  (A $\beta$ ). Metal ions are factors that induce the self-assembly of A $\beta$ . The first part of the lecture will focus on peptides and proteins that able to inhibit the initial seeding of the self-assembly of A $\beta$ . The peptides that demonstrated bifunctional activity of controlling the self-assembly in presence and in absence of metal ions are neuropeptides - small molecules that are produced and released by neurons.<sup>1,2</sup> The proteins that revealed inhibition of self-assembly of amyloids that our lab investigated recently are insulin<sup>3,4</sup> and insulin degrading enzyme. In the second part of the lecture, a series of novel designed peptides that have the capability to bind  $\text{Zn}^{2+}$  ions and to produce fibrillar structures will be presented.<sup>5</sup> The location and the type of the residues along the peptide sequence can determine the nature of the fibril. This work presents a proof-of-concept milestone for designing peptides with different properties to control and produce diverse materials.

1.Press-Sandler, O., Miller Y. Assessments of the Effect of Neurokinin B on Toxic A $\beta$  Aggregates in Alzheimer's Disease with the Molecular Mechanisms' Action. *ACS Chem. Neuro.* **2020**, 11, 3418.

2.Ben-Shushan, S., Hecel, A., Rowinska-Zyrek, , M., Kozlowski, H., Miller, Y. Zinc Binding Sites Conserved in Short Neuropeptides Containing a Diphenylalanine Motif. *Inorg. Chem.* **2020**, 59, 925.

3.Baram, M., Gilead, S., Gazit, E., Miller, Y. Mechanistic perspective and functional activity of insulin in amylin aggregation. *Chem. Sci.* **2018**, 9, 4244.

4.Baram, M., Miller, Y. Inhibitory Activity of Insulin on A $\beta$  Aggregation Is Restricted Due to Binding Selectivity and Specificity to Polymorphic A $\beta$  States. *ACS Chem. Neuro.* **2020**, 11, 445.

5.Simonovski, E., Miller, Y. Controlling the properties and self-assembly of helical nanofibrils by engineering zinc-binding  $\beta$ -hairpin peptides. *J. Mater. Chem. B.* **2020**, 8, 7352.