Functionalized protein nanomaterials and their biotechnological applications

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Amyloid Nanofibrils are formed by the N-terminal ends of Sup35(1-61) and Ure2(1-80) from Saccharomyces cerevisiae, which self-assemble with β-sheet secondary structure [1-3]. The extraordinary strength and robustness of these fibrils offer many advantages that can be exploited biotechnologically [4]. Functionalization of the fibrils is accomplished by designing fusion variants of the fibrillating protein with a functional domain. Nanofibrils with novel functions are obtained from co-aggregation, i.e. simultaneous aggregation of carrier and chimeric proteins.

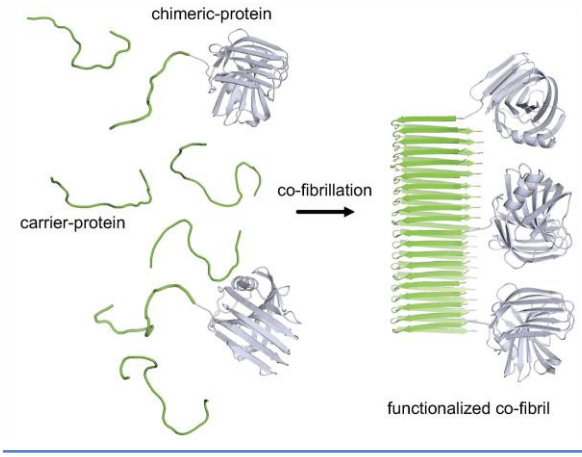

Figure 1. Peptides prone for aggregation into amyloid nanofibrils are linked genetically to a functional protein domain. After fibrillation of these fusion proteins, the functional domain is displayed on the surface of the amyloid fibril.

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[2] Maddelein, M. L., et al. *Molecular and cellular biology* **1999**, 19, 4516-4524.
[3] Ngo, S., et al. *JBC* **2011,** 286, 29691-29699.
[4] Smith, J. F., et al. *PNAS* **2006,** 103, 15806-15811.