Supporting information

Circular dichroism measurements of BI

As previously reported[1,2] bovine insulin forms amyloid fibrils incubated in acidic environment and elevated temperatures. Temperature-induced fibril formation by BI at 65°C (320 μM, 25 mM HCl) was followed by CD over a period of 10 h. The CD spectrum in the far UV-region (**Fig. 2a**) shows that native BI (nBI) has strong negative peaks at 208 nm and 222 nm, indicative of a helical structure and consistent with the crystal structure determined for insulin (**Fig. 1**)[3,4]**.** After 4h of incubation of BI, in 25 mM HCl and at 65°C, there is a significant decrease in the ellipticity at 222 nm, accompanied by a shift of the 208 nm band toward 206 nm, indicating that the protein is still largely helical, although with an increase in the content of random coil structure (minimum at 200 nm). As the solution is heated for longer periods of time, the ellipticity at 208 nm is further decreased and after 10 h of incubation of the protein, the CD spectrum in the far UV-region has a strong negative peak at 216 nm, indicative of β-sheet structure. Hence BI is changing its structure from an α-helical structure to a more β-sheet rich structure indicative for formation of amyloid fibrils. The results from our study are in good agreement with the results from an earlier CD- and FTIR-study of the amyloid formation in BI[5], although the concentration of BI was much higher in this earlier study than the concentration used herein. CD spectra were also recorded (data not shown) for the BI/PTAA solutions diluted to pH 7.0 and the spectra were similar to the results for the pure BI solutions, indicating that the interaction between PTAA and BI is not altering the structure of BI.

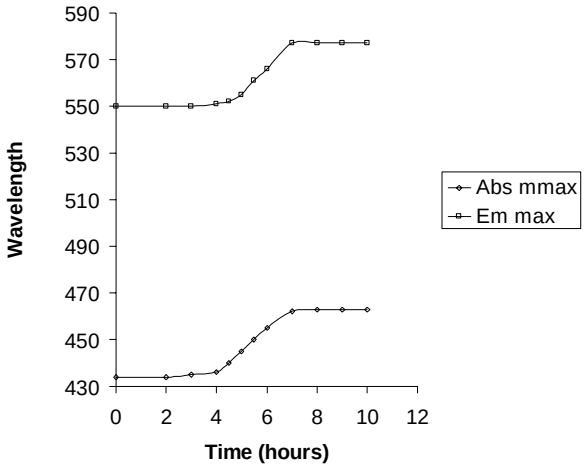
Fluorescence measurements of BI and PTAA

The primary blue shift of PTAA emission upon complexation to nBI suggests that the polyelectrolyte backbone becomes more non-planar and that separation of polyelectrolyte chains occurs. This separation of the polyelectrolyte chain is most likely due to the interaction between PTAA and nBI. A recent study[6] of a PTAA has shown a similar phenomenon, as the polyelectrolyte interacts with a positively charged peptide and a supermolecular α-helical structure is formed, indicating that the α-helical structure of nBI might be responsible for the separation of the polyelectrolyte chains. However, no induced circular dichroism was detected for PTAA bound to nBI (data not shown), suggesting that the polyelectrolyte backbone adopt a distorted conformation.

Upon complexation with fBI there is a red shift and a reduced intensity. The decreased intensity is probably due to aggregation of polyelectrolyte chains when PTAA interacts with the fibrils. The conformational changes of the polyelectrolyte backbone are likely the result of differential interactions of PTAA with the native forms of the proteins and the amyloid β-rich form of the proteins. The intensity of the fluorescence for the aggregated phase of polythiophene derivatives compared with the fluorescence for the single chain state has previously been showed to be weaker by approximately one order of magnitude[7,8] and the fluorescence is probably decreased due to non-radiative deexcitation. This new channel for deexcitation is created due to contacts between polymer chains[9].

Supporting table 1: Absorption- and emission maxima for PTAA mixed with BI incubated for different times in 25 mM HCl at 65°C. After mixing the samples where diluted with 20 mM Na-phosphate to pH 7.0 (23°C) prior to the absorption and emission measurements.

Incubation time (h)	Absorption maximum (nm)	Emission maximum (nm)
0	434	550
2	434	550
3	435	550
4	436	551
4.5	440	552
5	445	555
5.5	450	561
6	455	566
7	462	577
8	463	577
9	463	577
10	463	577
24	463	577
72	463	577



Supporting Figure 1: Time plots of the absorption maxima and emission maxima for PTAA mixed with BI incubated for different times in 25 mM HCl at 65°C. After mixing the samples where diluted with 20 mM Na-phosphate to pH 7.0 (23°C) prior to the absorption and emission measurements.

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