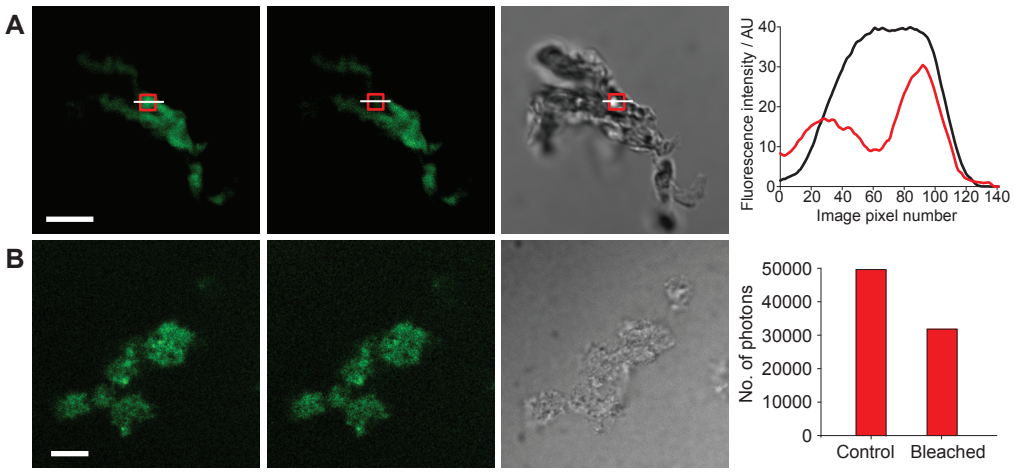
Electronic Supplementary Material (ESI) for Analyst

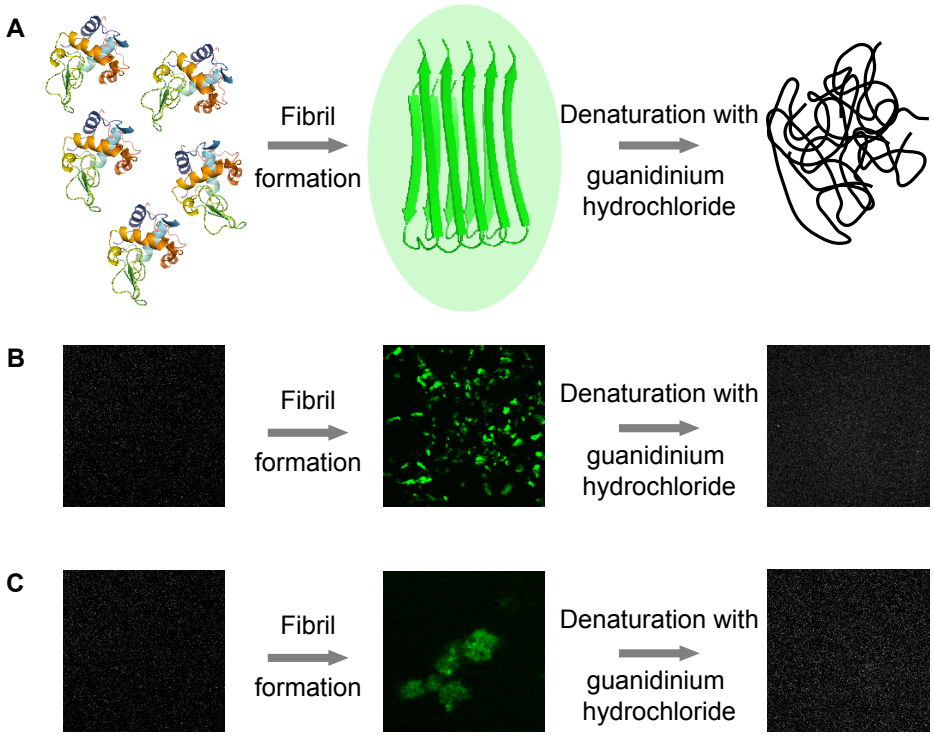
Disease-related protein aggregates display an amyloid-specific fluorescence signature: Supplementary information

Fiona T.S. Chan, Gabriele S. Kaminski Schierle, Janet R. Kumita, Carlos W. Bertoncini, Christopher M. Dobson, Clemens F. Kaminski

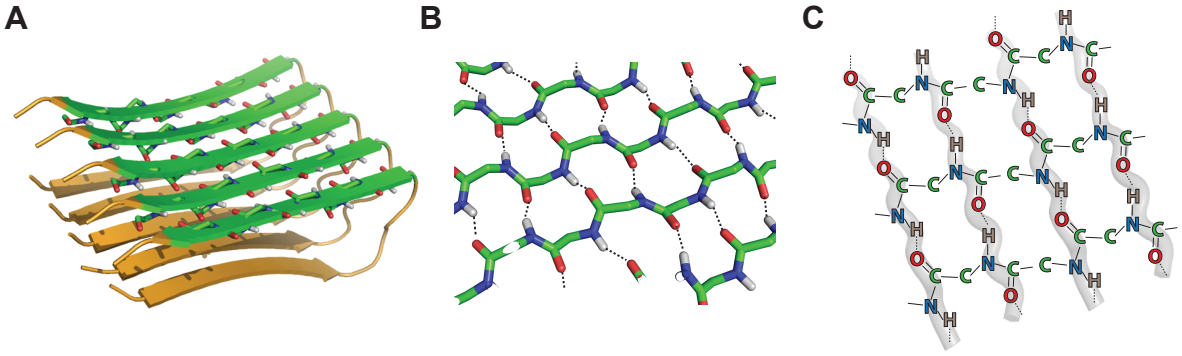
1 Supplementary results



Supplementary Figure 1. The fluorescence emission from amyloid structures can be photobleached. A: I59T lysozyme aggregate. Columns 1-4: intrinsic fluorescence image before continuous irradiation. Scale bar, 20 µm; fluorescence image after irradiation to photobleach the area marked by the red square; differential interference contrast image of the aggregate; a plot of fluorescence intensity before (black) and after (red) bleaching, along the white line. B: Aβ(33–42) aggregate. Columns 1-4: intrinsic fluorescence image before continuous irradiation. Scale bar, 10 µm; fluorescence image after irradiation to photobleach; differential interference contrast image of the aggregate; a plot of fluorescence intensity before (black) and after (red) bleaching.



Supplementary Figure 2. Fibril formation is associated with fluorescence behavior. Amyloid formation leads to increasing levels of fluorescence emission from polypeptides, which disappears upon denaturation with 8 M guanidinium hydrochloride. A: Schematic to illustrate the conversion of proteins from a native structure to amyloid fibrils, and from the amyloid structure to a disordered structure upon denaturation with guanidinium hydrochloride. Only the amyloid structure is associated with fluorescence. B: Measured fluorescence images of I59T lysozyme in the corresponding states of aggregation. Scale bar, 20 µm. C: Measured fluorescence images of Aβ(33-42) in the corresponding states of aggregation. Scale bar, 10 µm.



Supplementary Figure 3. Formation of hydrogen bonds may give rise to delocalization of peptide orbital electrons participating in hydrogen bonding[12,14]. A: Structural model for Aβ42 amyloid fibrils (2BEG) in which the backbone atoms of one of the β-sheets have been highlighted (carbon in green, nitrogen in blue, oxygen in red and hydrogen in grey). B and C: Close up view of the network of hydrogen bonds established between amide hydrogens and carbonyl oxygen atoms. The electron delocalization network is highlighted in grey.