Supplementary Information

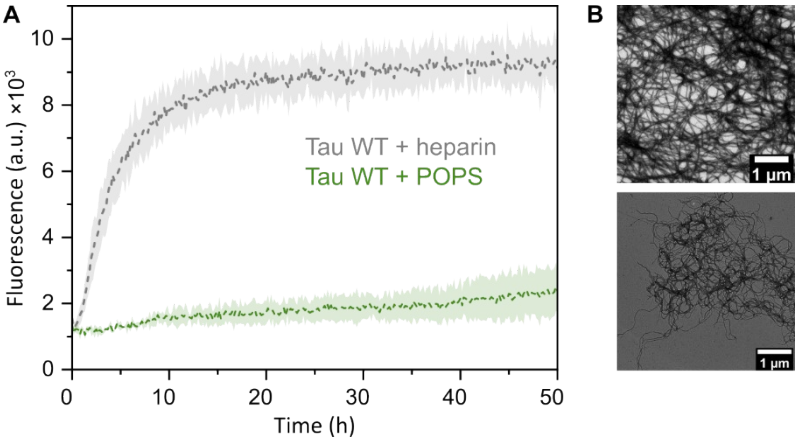

Figure S1: *(A). Tht fluorescence intensity measured over time for Tau WT in the presence of heparin or POPS liposomes. (B). Electron microscopy images of Tau-P301L after incubation with heparin (up) or POPS (down)*

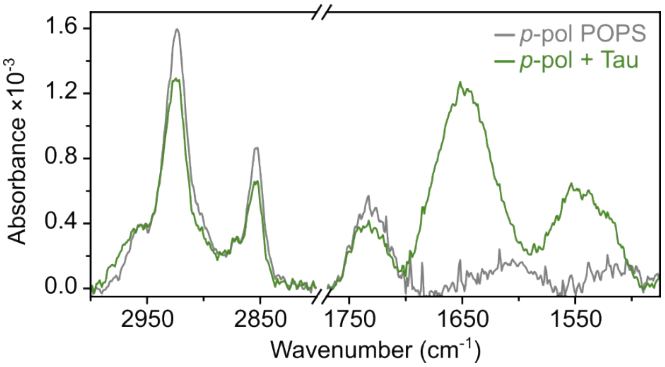

Figure S2: *ATR-FTIR spectrum before (grey) and after (green) Tau incubation on POPS bilayer at the p (90°, solid lines) polarization at 5 µM.*

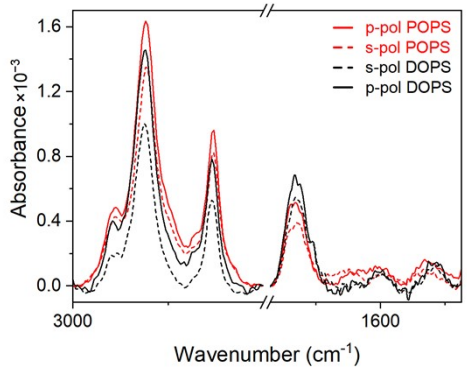

Figure S3*: Comparison between ATR-FTIR spectra obtained on POPS (red) and DOPS bilayers (black).*

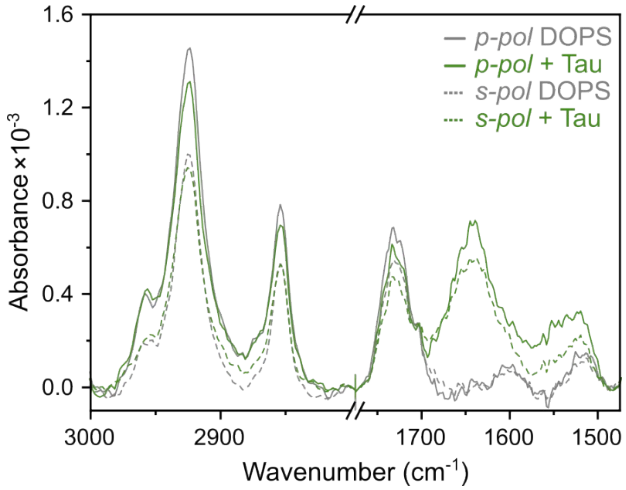

***Figure S4**: p and s-polarized ATR-FTIR spectra of a DOPS-supported lipid bilayer before (grey) and after (green) a 3-hour incubation with Tau-P301L (1µM) are shown in both high and low wavenumber ranges. The dashed lines correspond to the s-polarized ATR-FTIR spectra.*

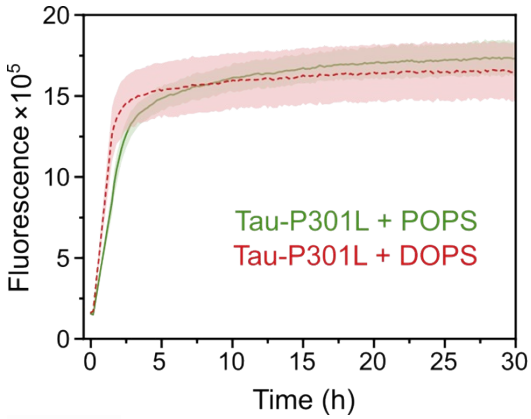

***Figure S5**: Thioflavin T fluorescence intensity measured at 485 nm over time with Tau-P301L (20 µM) with POPS or DOPS liposomes (200 µM)*

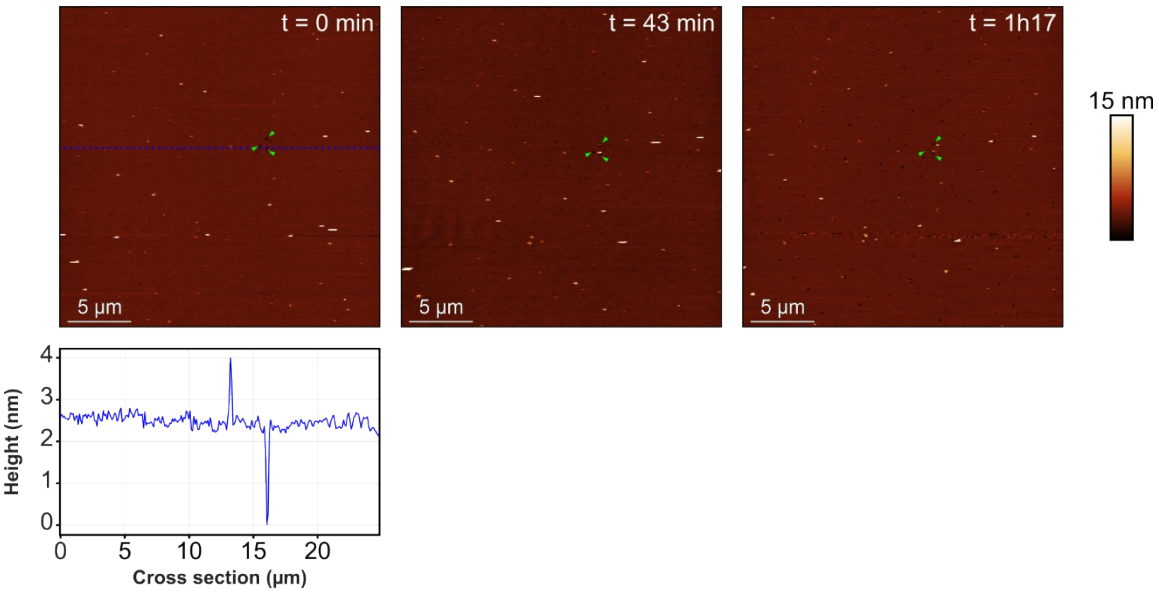

***Figure S6: AFM image of a DOPS SLB over time.** The same area of the DOPS bilayer was imaged over time to check its integrity. A defect in the SLB, indicated by green arrowheads, allowed the determination of the thickness of the bilayer, which is about 3nm.*

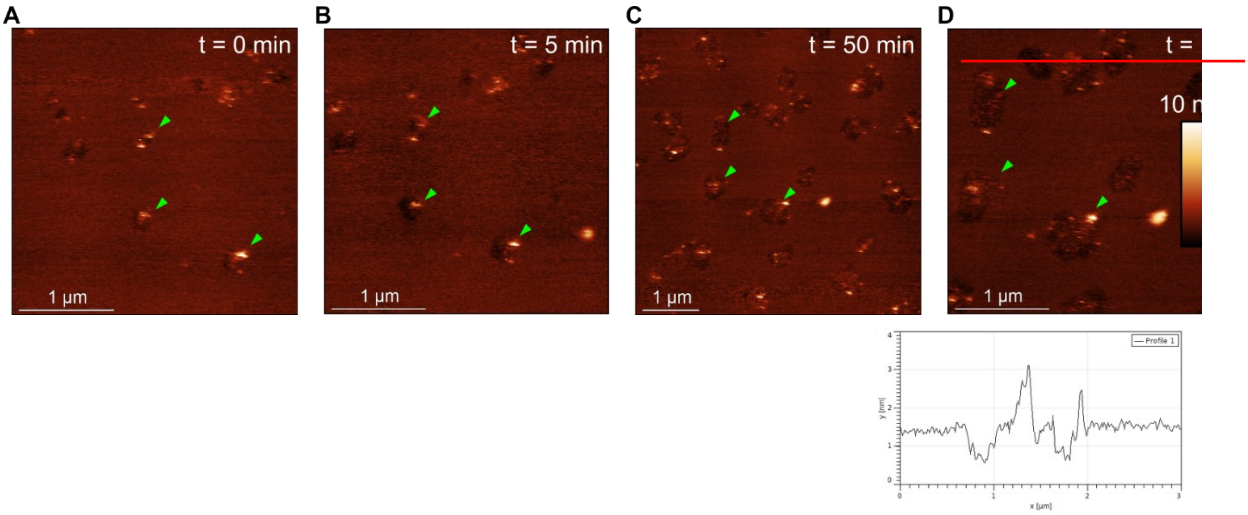

Figure S7: *DOPS supported lipid bilayer before (A) and after 5 min (B), 50 min (C) and 1h (D) of injection of 300 nM of Tau-P301L. Green arrows follow defect widening over time. A cross section of panel D allows measuring the depth of defects after 1 h.*

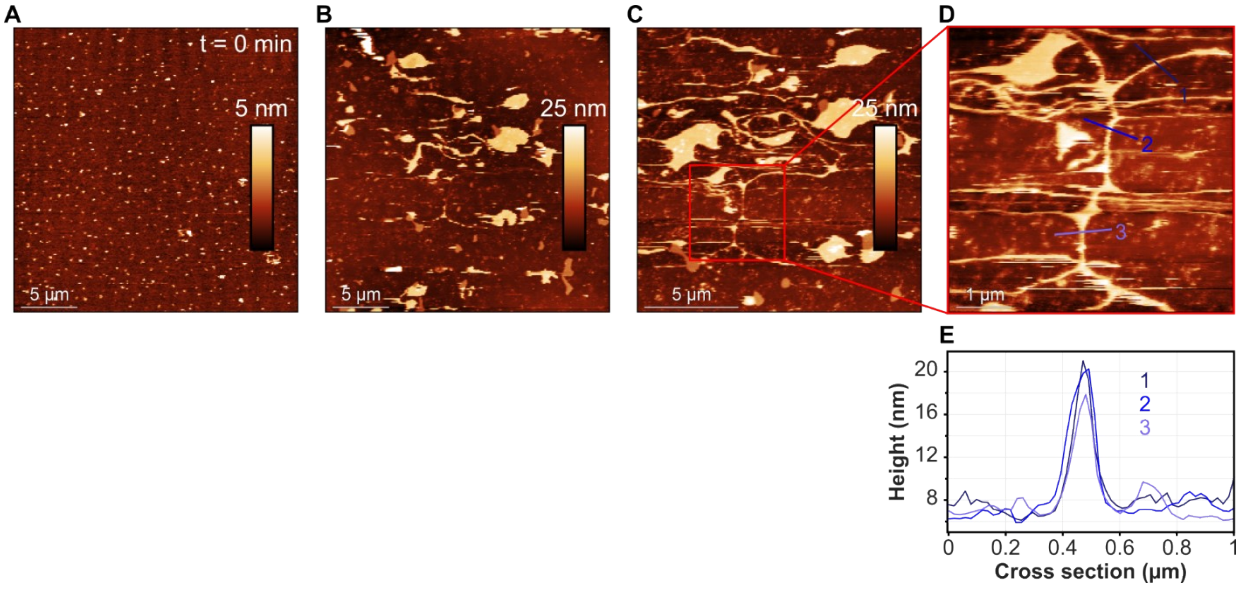

Figure S8: *DOPS supported lipid bilayer before injection (A) and after incrementing the concentration of Tau-P301L, at 400 nM and an incubation of 30 mn - 1h (B), and at a final concentration of 500 nM on a 1-hour timescale (C). Zoom in on the fibrillar structures of C (D) and cross-sections of three of them (E).*