**Supplemental Figures for:**

# Point mutations in Aβ induce polymorphic aggregates at liquid/solid interfaces

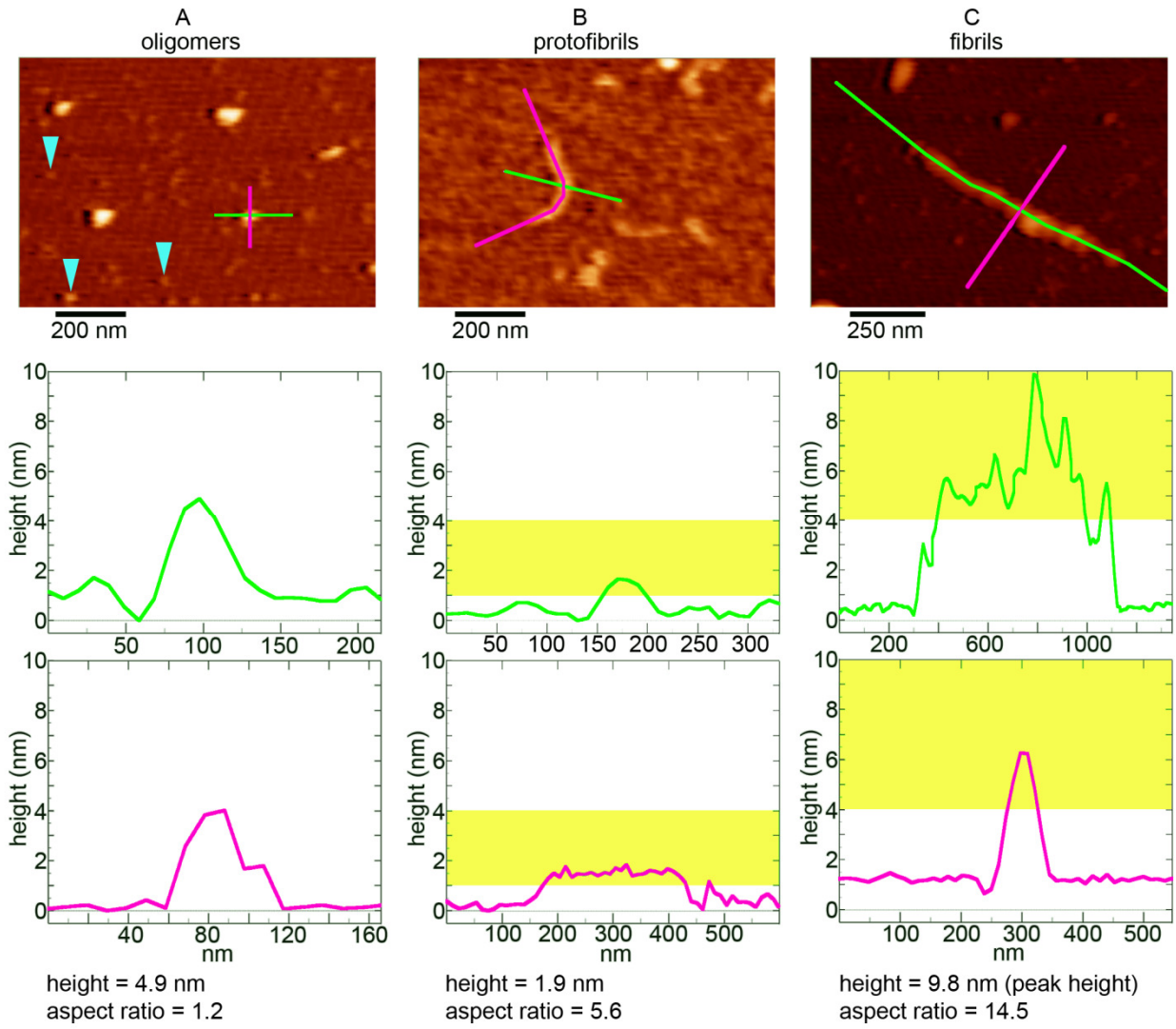
*Elizabeth A. Yates[1], Elena M. Cucco[3], and Justin Legleiter[1,2,3,*]*

[1]The C. Eugene Bennett Department of Chemistry; [2]WVnano Initiative; [3]the Center for Neurosciences,

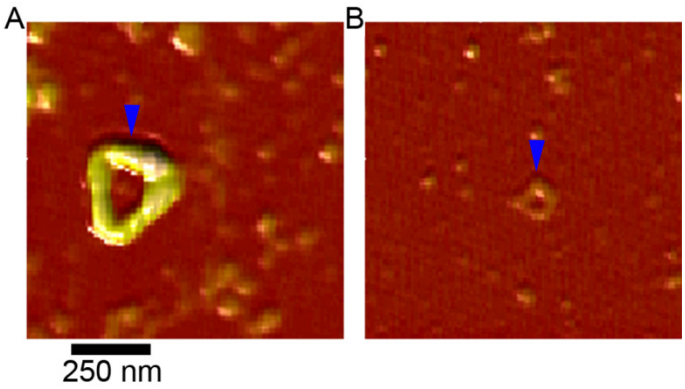
West Virginia University; 217 Clark Hall; PO Box 6045; Morgantown, WV 26506

* Corresponding author:

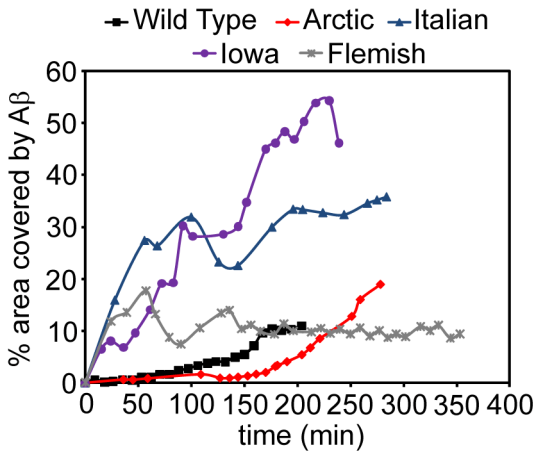
Justin Legleiter
West Virginia University
The C. Eugene Bennett Department of Chemistry
217 Clark Hall
PO Box 6045
Morgantown, WV 26506
Email: justin.legleiter@mail.wvu.edu
Phone: (304)293-3435 ext. 6436
Fax: (304) 293-4904




**Supplemental Figure 1. Representative *ex situ* AFM images demonstrate the classification of Aβ aggregates.** Representative AFM images and aggregate profiles that compare basic dimensions of (A) oligomers, (B) protofibrils, and (C) fibrils are shown. Height profiles under each image are indicated by *colored lines*. The blue arrows in (A) indicate the appearance of smaller oligomers. By using a combination of height and aspect ratio, relative populations of aggregates types can be distinguished and quantified in a heterogeneous mixture. Oligomers can be distinguished from protofibrils and fibrils by aspect ratio. Protofibrils and fibrils can be distinguished from each other by height, as indicated by the yellow shading in the height profiles.




**Supplemental Figure 2. A small number of annular aggregates were observed in incubations of Wild Type and mutant Aβ.** (A) Large ring structures with inner diameters on the order of 100 nm and (B) small ring structures with inner diameters on the order of 25 nm were observed.




**Supplemental Figure 3. Wild Type and mutant forms of Aβ absorb to mica with variable rates.** Quantification of the percent of the surface covered by aggregates of the different forms of Aβ as a function of time is presented. While the absorption of Wild Type, Arctic, Italian, and Iowa Aβ was performed at 20 μM, Flemish Aβ experiments were performed at a higher concentration (40 μM) as very little Flemish Aβ aggregation was observed at 20 μM within 400 minutes.

**Supplemental Movie 1. A series of *in situ* AFM images demonstrating the aggregation of Wild Type Aβ(1-40) on mica.** The aggregation was recorded over a time period of 204 min. with 24 frames.

**Supplemental Movie 2. A series of *in situ* AFM images demonstrating the aggregation of Arctic Aβ(1-40) on mica.** Colored boxes indicate regions of interest where oligomers eventually nucleated or were incorporated into highly ordered fibrillar aggregates. These elongated aggregates displayed long range order as they grew in three specific directions defined by the underlying mica substrate. The aggregation was imaged over a time period of 278 min. with 19 frames.

**Supplemental Movie 3. A series of *in situ* AFM images demonstrating the aggregation of Italian Aβ(1-40) on mica.** In the purple and blue boxes, smaller oligomers appear to coalesce into larger oligomers and highly curved fibrillar structures reminiscent of protofibrils. The yellow box indicates a region where some more rigid (straight morphology) fibrillar aggregates appeared that were similar to those formed predominately by Arctic Aβ on mica. The aggregation was imaged over a time period of 284 min. with 15 frames.

**Supplemental Movie 4. A series of *in situ* AFM images demonstrating the aggregation of Iowa Aβ(1-40) on mica.** Purple and yellow boxes highlight areas where small oligomers (2-3 nm tall) of Iowa Aβ initially are the predominate aggregate formed, but these oligomers quickly coalesed into a dense mesh of elongated aggregates. The aggregation was imaged over a time period of 239 min. with 22 frames.

**Supplemental Movie 5. A series of *in situ* AFM images demonstrating the aggregation of Flemish Aβ(1-40) on mica.** Within the purple box, smaller and larger oligomers come together to form a larger oligomeric aggregates. The yellow box indicates a region where some oligomers aggregated into extended fibrillar structures reminiscent of protofibrils. The aggregation was imaged over a time period of 353 min. with 32 frames.