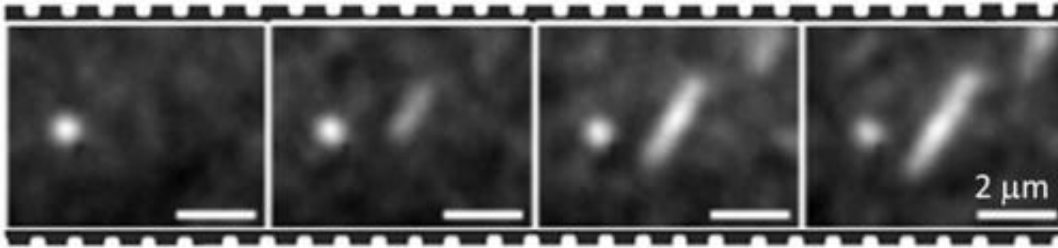


Watching nanoscale assembly live

January 5 2015, by Max Ryadnov



A shortened time-lapse sequence of fluorescent micrographs showing a growing protein filament (centre), with the bright round aggregate (left) used as a reference point

Ebola virus, Alzheimer's amyloid fibrils, tissue collagen scaffolds and cellular cytoskeleton are all filamentous structures that spontaneously assemble from individual proteins.

Many [protein filaments](#) are well studied and are already finding use in [regenerative medicine](#), molecular electronics and diagnostics. However, the very process of their assembly - [protein](#) fibrillogenesis - remains largely unrevealed.

A better understanding of this process through direct observation is anticipated to offer new applications in biomedicine and nanotechnology while providing efficient solutions for pathogen detection and molecular therapy. The formation of protein filaments is highly dynamic and occurs over time and length scales that require fast measurements with nano-to-micrometer precision. Although many methods can meet these

criteria the caveat is to measure in water and in real time. The challenge is compounded by the need to have a homogeneous assembly characterised by uniform growth rates of uniformly sized filaments.

To tackle this challenge, an NPL team devised an archetypal fibrillogenesis model based on an artificial protein whose assembly was recorded in real time using super-resolution microscopy approaches. The findings have been published in Nature Publishing Group's *Scientific Reports*.

Angelo Bella, Higher Research Scientist in NPL's Biotechnology Group explains: "By being able to continuously image the assembly from the start to maturation we established that protein monomers recruit at both ends of growing filaments at uniform rates in a highly cooperative manner."

The study provides a measurement foundation for studying different macromolecular assemblies in [real time](#) and holds promise for engineering customised nano-to-microscale structures in situ.

More information: "Filming protein fibrillogenesis in real time" *Scientific Reports* 4, Article number: 7529 [DOI: 10.1038/srep07529](https://doi.org/10.1038/srep07529)

Provided by National Physical Laboratory

Citation: Watching nanoscale assembly live (2015, January 5) retrieved 26 April 2024 from <https://phys.org/news/2015-01-nanoscale.html>

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