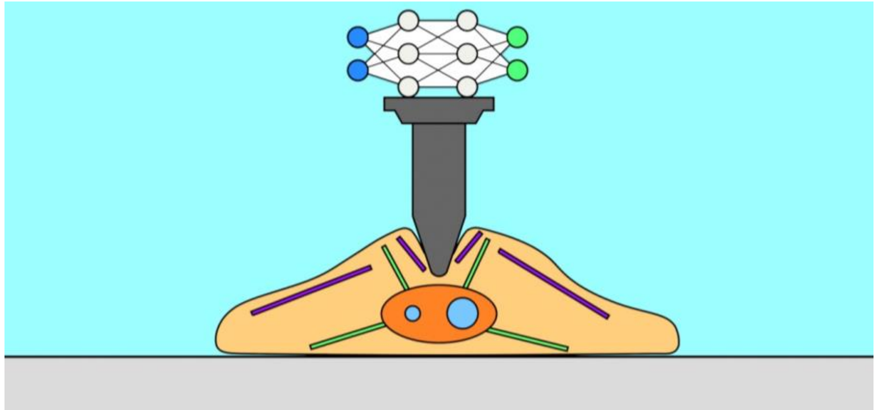
Technology Offer CSIC/PT/067

Accelarating AFM nanomechanical measurements of cells by Artificial Intelligence



This tool is designed for fast processing of atomic force microscopy (AFM) data and to extract nanomechanical properties of soft samples such as polymers, cells or tissues in their native state.

Intellectual Property

Priority patent application filed

Intended Collaboration

Licensing and/or co-development

Stage of development

Technology ready for test in an industrial environment

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Market need

Currently there are no machine learning methods that extract viscoelastic properties of a material from AFM force spectroscopy curves. This limits the speed of processing of topographic and nanomechanical maps of cells and tissues. Therefore, AFM applications on cell biology and clinical research are limited by the low throughput of the technique.

Proposed solution

The technology presented reduces the computational time required to process a force volume of a cell from several hours to minutes. The method incorporates a supervised machine learning regressor for transforming AFM force-distance curves into nanorheological behaviour. The regressor predicts the modulus and the fluidity coefficient of mammalian cells with a relative error below 4%. This development will facilitate relevant advancements on fields related to clinical research, mechanobiology, cell biology, nanomedicine or advanced polymer synthesis.

Competitive advantages

- Accurate determination of nanomechanical properties such as scaling modulus or fluidity coefficient.
- Up to 50 fold speed up in the processing of AFM measurement of viscoelastic samples.