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### Estimating nanoparticle strength

#### Clarifying mechanical properties with force spectroscopy.


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Branched structures composed of nanoparticle chain aggregates (NCAs) are technologically important for manufacturing composite materials with enhanced mechanical properties such as reinforced rubber. However, the mechanism of NCA chain interaction with elastomers and the elastic nature of NCAs are not well understood and need to be studied quantitatively. Now, Sheldon Friedlander and colleagues describe force versus displacement (force spectroscopy) measurements of the interaction of an atomic force microscope tip with graphitic NCAs deposited on a silicon substrate<sup>1</sup>. The characteristic sawtooth patterns observed were interpreted as a series of aggregate stretching and breaking events. Using this approach, estimated values of Young's modulus of single aggregates were found to be significantly lower than expected, and provide a more general mechanistic insight into the influence of these nanoparticles on the bulk mechanical properties of elastomers.

#### References

1. Rong W., Pelling A. E., Ryan A., Gimzewski J. K. & Friedlander S. K. Complementary TEM and AFM force spectroscopy to characterize the nanomechanical properties of nanoparticle chain aggregates. *Nano Letters* published online 16 October 2004

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