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Determination of Young's Modulus of Graphene by Raman Spectroscopy JAE-UNG LEE, DUHEE YOON, HYEONSIK CHEONG, Department of Physics, Sogang University, Seoul, Korea — The mechanical properties of graphene are interesting research subjects because its Young's modulus and strength are extremely high. Values of ~ 1 TPa for the Young's modulus have been reported [Lee et al. *Science*, **321**, 385 (2008), Koenig et al. *Nat. Nanotech.* **6**, 543 (2011)]. We made a graphene sample on a SiO_2/Si substrate with closed-bottom holes by mechanical exfoliation. A pressure difference across the graphene membrane was applied by putting the sample in a vacuum chamber. This pressure difference makes the graphene membrane bulge upward like a balloon. By measuring the shifts of the Raman G and 2D bands, we estimated the amount of strain on the graphene membrane. By comparing the strain estimated from the Raman measurements with numerical simulations based on the finite element method, we obtained the Young's modulus of graphene.

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