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On the Cover: Atomic force microscopy image of a polymer film. For further information see Damaceanu et al., pp. 545–557.

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- WORLD HEALTH ORGANIZATION (2011). WHO Fact Sheet No. 317—Cardiovascular diseases (CVDs). Available at www.who.int/ mediacentre/factsheets/fs317/en/24-05-11.
- FIORI, C.E. & SWYT-THOMAS, C.R. (1991). U.S. Patent number 5,299,138, accepted 1994. Desk top spectrum analyzer. Free version available at http://www.cstl.nist.gov/div837/Division/ outputs/software.htm.
- CHANTLER, C.T., OLSEN, K., DRAGOSET, R.A., CHANG, J., KISHORE, A.R., KOTOCHIGOVA, S.A. & ZUCKER, D.S. (2005). X-ray form factor, attenuation and scattering tables (version 2.1). Gaithersburg, MD: National Institute of Standards and Technology. Available at http://physics.nist.gov/ffast.

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