research is a first step in determining what actions we should take to address this bias.

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References and Notes

1. R. May, *Science* **241**, 1449 (1988).
2. K. Gaston, R. May, *Nature* **356**, 281 (1992).
3. R. Shine, X. Bonnet, *Trends Ecol. Evol.* **15**, 221 (2000).
4. X. Bonnet *et al.*, *Trends Ecol. Evol.* **17**, 1 (2002).
5. A. Leopold, *A Sand County Almanac, and Sketches Here and There* (Oxford Univ. Press, New York, 1949).
6. C. Hilton-Taylor, *2000 IUCN Red List of Threatened Species* (IUCN, Gland, Switzerland, and Cambridge, UK, 2000).
7. For comparisons among insects, we used R. Arnett Jr., *American Insects* (CRC Press, Boca Raton, FL, ed. 2, 2000).
8. B. Czech *et al.*, *Conserv. Biol.* **12**, 1103 (1998).
9. See supplemental figure available on *Science Online* at www.sciencemag.org/cgi/content/full/297/5579/191/DC1.

Igniting Nanotubes with a Flash

THE ASTONISHING RESULTS OF P. M. AJAYAN *et al.* ("Nanotubes in a flash—ignition and reconstruction," Brevia, 26 April, p. 705) demonstrating ignition of carbon nanotubes after exposure to a photographic flash inspired us to make further explorations along the same lines. We found that similar effects can be obtained with other carbons that bear noble metal catalysts, for example, Pd on carbon.

We first reproduced both the photoacoustic effect and the ignition of single-walled carbon nanotubes. Exposing commercially available nanotubes (HiPco or as-prepared samples from Tubes@Rice) to a flash from an ordinary photoflash unit held 1 to 3 cm from the surface of the samples resulted in easily heard retorts. Sound intensity increased as the flash was moved closer to the samples. On very close approach (<1 cm), both nanotube samples ignited with a dull red glow. These two materials contain catalytic particles of iron or nickel/cobalt alloy, respectively, in addition to carbon. Other carbons (Norit-activated carbon and graphite powder) produced a weaker photoacoustic effect but did not ignite. However, several commercial Pd catalysts supported on carbon (Pd loadings of 5, 10, and 30 weight %) all produced marked photoacoustic effects and ignition. Simple physical mixtures of Pd powder, iron carbide powder, or copper powder with graphite or Norit produced photoacoustic effects but not ignition. Similarly, graphite powder that was sputter-coated with very small amounts of Pd did not ignite.

Our simple survey indicates that the photoacoustic effect and ignition are not peculiar to carbon nanotubes. The common features of materials that ignite are the combination of a well-dispersed metal catalyst in intimate contact with a high–surface area carbon. Although the mechanism of this ignition process is unclear, we hypothesize that it arises from photophysical effects associated with metal and carbon in chemical contact.

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Response

BOCKRATH *ET AL.* CONFIRM OUR EXPERIMENTAL observation about the photoignition of single-walled carbon nanotubes (SWNTs) but suggest that the catalytic particles present in the sample play a key role in the ignition process. Although this might be the case, the ignition process is far more complicated than that. Indeed, the lack of ob-

servable photo-induced sound and ignition in our experiments with chemical vapor deposition–grown multiwalled nanotubes (MWNTs) and compacted SWNTs, both of which have catalyst particles of a similar fraction, size, and chemical state to those of uncompacted SWNTs, indicates that the unique structure of the carbon and the density of the nanotubes are the primary factors that give rise to photoacoustic response and ignition. In other words, as we indicated in our Brevia, the heat confinement in the carbon structures (i.e., avoiding dissipation into the bulk) is necessary to achieve the temperatures required for ignition. At that point, the catalytic particles most likely help ignition, as Bockrath *et al.*'s results indicate.

The structural reconstruction of the SWNTs (during exposure to light flash in vacuum or inert gas atmospheres) in the absence of ignition (in air) occurs throughout the sample, not just near the relatively sparse catalytic particles; the high temperatures required for such reconstructions will naturally oxidize and burn carbon in air whether catalysts are present or not.

Although the results of Bockrath *et al.* show that the catalytic particles play a favorable role in the ignition process, the exact mechanism is not understood. In particular, the role of the density, nature, and dimensions of the carbon surfaces; the nature and size of catalytic particles; and the carbon-catalytic interface need to be determined. Finally, it would also be crucial to test metal-free SWNTs, but, unfortunately, such samples can only be prepared by purification procedures that effectively densify the samples and, hence, remove the photo-induced effects.

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Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted by e-mail (science_letters@aaas.org), the Web (www.letter2science.org), or regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

Eisenstein's Departure from the NSF

CONTRARY TO YOUR RECENT REPORT ("Eisenstein leaves NSF," ScienceScope, May 17, p. 1219), the National Science Foundation (NSF) did not "decline to comment" on the departure of Robert A. Eisenstein, Assistant Director for Mathematics and Physical Sciences. We were simply unable to comment by your press deadline.

Eisenstein, who will remain with NSF and begin a professional development tour at CERN this spring, has made valuable contributions to the NSF and to American science during the past 10 years. He proved to be a remarkably able and innovative administrator of complex and expensive projects, including the LIGO gravitational wave observatories, the Gemini telescopes, U.S. components of the Large Hadron Collider, and the Atacama Large Millimeter Array.

The NSF and the international physics community have benefited enormously