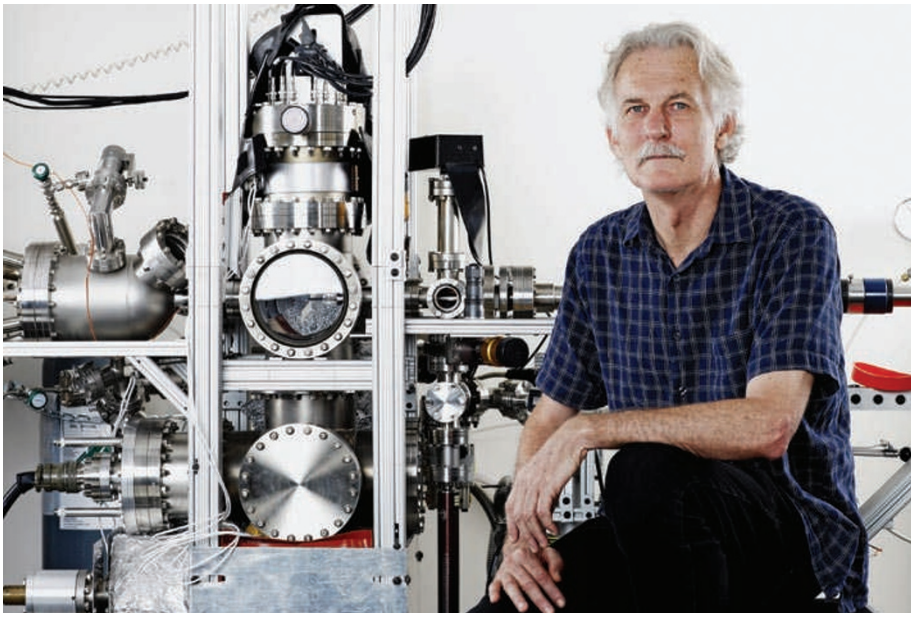

MALI AZIMA/GEORGIA TECH

Walter de Heer says that background information supporting the physics award contains inaccuracies.

PHYSICS

Nobel document triggers debate

Critics say that explanation of the 2010 award in physics slights other contributions to graphene research.

BY EUGENIE SAMUEL REICH

Controversy surfaced last week over a document issued by the Nobel Committee for Physics to explain its awarding of the 2010 prize, leaving the committee on the defensive. It is scrambling to correct errors while standing by the process underlying its decision.

Last month, the committee awarded the prize to Andre Geim and Konstantin Novoselov at the University of Manchester, UK, "for groundbreaking experiments regarding the two-dimensional material graphene". The novel material — composed of a single crystalline layer of carbon atoms — could have a host of applications, from touch screens to transistors.

The deliberations of the Nobel committee are notoriously secretive, but for a sense of its thinking researchers turn to the 'Scientific Background' document prepared by members of the Royal Swedish Academy of Sciences and placed online at the time of the prize announcement.

That document came under fire last week as researchers questioned several alleged misstatements. "The Nobel prize committee did not do its homework," says physicist Walter de Heer of the Georgia Institute of Technology in Atlanta, who sent a letter to the committee on 17 November listing his objections.

According to the background document, Geim and Novoselov galvanized the field with a widely cited 2004 paper[1]. In a caption, the Nobel document describes a figure from the paper as showing data on graphene's electronic properties — but the data were actually collected from a few layers of graphene stacked together, a material better known as graphite. The distinction is significant because the two have different electronic properties.

De Heer says in his letter that Novoselov and Geim did not report measurements on single-layer graphene until 2005 (ref. 2). He also says that a 2004 paper by his own group[3] included measurements made on a single layer of graphene, although he did not realize it at the time.

Other alleged errors in the document downplay the work of Philip Kim of Columbia University in New York, who many think should have shared the prize. When the Manchester group published crucial electronic measurements on graphene[4] in *Nature* in 2005, the paper appeared back-to-back with one from Kim's group[5]. "He made an important contribution and I would gladly have shared the prize with him," says Geim.

Geim and other experts contacted by *Nature* agree that the document does not seem to have been carefully assembled. "It could have been written better," says Geim, who only read it after controversy erupted over its contents.

De Heer also accuses the committee of falling for a straw-man argument when it says that Geim and Novoselov's work came as a complete surprise to the physics community because graphene was presumed to be unstable. "That statement is inaccurate," agrees Paul McEuen of Cornell University in Ithaca, New York. Prior observations of graphene[6] date back to at least 1962.

The committee seems to be responding to some of the criticisms. "We will make a correction to the web version," says Ingemar Lundström, chairman of the committee. "Some of the things we also think are mistakes."

Since de Heer's letter became public, other graphene researchers have contacted *Nature* to take issue with the Nobel committee's document. Bor Jang, co-founder of graphene producer Angstron Materials in Dayton, Ohio, says that Geim and Novoselov have often wrongly been credited with discovering graphene — an implication also made by the subheading "the discovery of graphene", which appears in the document shortly before their work is discussed. "I totally disagree with this assessment," says Jang.

De Heer says he thinks that the award of the prize for graphene this year is premature, saying more time is needed to see the material's potential fulfilled. But he strongly denies being motivated by sour grapes. His concern with the document, he says, is that its errors misrepresent contributions made by several researchers.

"The Nobel prize committee did not do its homework."

Per Delsing at Chalmers University of Technology in Gothenburg, Sweden, an adjunct member of the Nobel committee, acknowledges that there is some dispute about whether graphene was believed to be stable and whether the 2004 work came as a surprise to the community or not. But he defends the committee's work. "Different people can of course have different opinions. Let me assure you that the Nobel committee has done a lot of research into this issue," he says. ■

1. Novoselov, K. S. *et al. Science* **306,** 666–669 (2004).
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3. Berger, C. *et al. J. Phys. Chem. B* **108,** 19912–19916 (2004).
4. Novoselov, K. S. *et al. Nature* **438,** 197–200 (2005).
5. Zhang, Y. *et al. Nature* **438,** 201–204 (2005).
6. Boehm, H. P. *et al. Zeitschrift für Naturforschung B* **17,** 150 (1962).