



## From the Editor's Desk

### ***A Nobel Prize in Microwave Engineering?***

■ Madhu S. Gupta

One of the goals of this magazine is to present new and emerging technologies in the microwave field, and their impact, not only to microwave professionals, but also to others—the proverbial “intelligent laypersons.” Recently (as this issue goes to print), the announcements of the various Nobel Prizes have been prominently featured in the news, and have highlighted the scientific advancements in their respective fields. Such public attention, brought to a scientific work by the award of a Nobel Prize for it, can hardly be matched by anything else, even if over the years the works recognized by these awards have ranged from very significant to obscure, and do not always seem to qualify as a “service to the mankind” that Alfred Nobel envisioned in his will. Service alone is not enough—the microwave oven probably serves mankind close to a billion times a day, but lacks the intrigue of fundamental particle physics. Apparently, one way to bring the accomplishments of microwave engineers to the attention of general public would be to institute a “Nobel Prize in Microwave Theory and Techniques.”

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Alfred Nobel was an inventor and industrialist, with hundreds of patents to his credit, but his best known work was on explosive materials; specifically, he worked on making nitroglycerine a safer explosive, called dynamite. His accomplishments were therefore in engineering. Moreover, his father was also in the mechanical and construction engineering field. However, when Alfred established the Nobel Foundation, and endowed the prizes that we now call Nobel Prizes, he did not select engineering as one of the fields in which to recognize outstanding work by a Nobel Prize. The prizes he established were for work in fields with which he could relate professionally—physics and chemistry, given his background in explosives and chemicals—and in fields of personal interest to him: medicine (he had significant health problems throughout his life), literature (he liked poetry), and peace (his friend Countess Bertha von Suttner was a champion of peace). If he had been an artist, or a musician, or a philosopher, it is possible he might have included those fields of endeavors in his bequest. Obviously, he could not have established a Nobel prize for the microwave discipline, which did not become an identifiable field of work until half a century after his death!

Even if the field of microwaves had

been an established scientific discipline, a Nobel prize for microwave engineering would have been unlikely. It has often been pointed out that there is a systematic bias in the awarding of Nobel prizes in favor of scientific and theoretical works and against engineering. Many examples can be cited to back up this assertion: for example, the award of a Nobel prize for holography to Gabor, who conceptualized it, but not to Emmet Leith, who reduced it to practice. The 2003 Nobel prize in medicine, for work on magnetic resonance imaging (MRI), was awarded to Paul Lauterbur and Peter Mansfield, but excluded Raymond Damadian, who holds a basic patent on MRI, has had his patent upheld in the court, receives large royalties on the patent from manufacturers of MRI systems, and has protested the selection of Nobel laureates through full-page advertisements in *The New York Times* and *The Washington Post* in October 2003.

Admittedly, it is not quite correct to say that there is no Nobel Prize for work in the microwave field. A number of the Nobel Prizes for Physics have been awarded for work related to microwave engineering. These include the awards to Charles H. Townes (Physics, 1964, for work on ammonia beam masers) and Norman F. Ramsay

(Physics, 1989, for atomic hydrogen maser). In addition, some of the awards have recognized work that has had significant microwave device applications: Leo Esaki (Physics, 1973) received his award for tunneling in semiconductors, which led to tunnel diodes, used as an active and nonlinear microwave device for decades; Brian D. Josephson (Physics, 1973) was recognized for the discovery of Josephson junctions, also used as diodes for microwave generation and switching at microwave frequencies; and Herbert Kroemer (Physics, 2000) was honored for his work on semiconductor heterostructures used in high-speed electronics. Another microwave engineer honored with the Nobel Prize has been Hans A. Bethe (Physics, 1967) whose award was for developing a theory of stellar nuclear reactions, but who, earlier in his career at MIT Radiation Laboratory, had invented a microwave directional

coupler — the Bethe hole coupler.

People in other disciplines have long complained about there being no Nobel prizes in their fields. The Fields Medal in mathematics is one example of the resulting corrective action on the part of the mathematicians, and the prestige it commands in its own field is equivalent to that of a “Nobel prize of mathematics.” Several other “Nobel-equivalent” prizes have also been endowed in the century since Nobel established his prizes, such as the Wolf Prize and the Kyoto Prize, but nothing gets the media attention that Nobel Prizes get. The only exception is the award, instituted by the Bank of Sweden in 1968, called the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel, that is now lumped together with the other Nobel Prizes in the popular press.

So what will it take to have a “Nobel Equivalent” prize in the field of

microwave theory and techniques? One necessary (but not sufficient) condition is financial resources. Large fortunes have indeed been made in microwave engineering, but usually by corporations, not individuals. The field of microwave engineering does not appear to have an obvious affluent patron, a “Bill Gates of microwave engineering” who would have a soft spot for microwave engineering.

Until then, IEEE Microwave Theory and Techniques Society Awards are as close as you can come to a Nobel Prize in microwave engineering. The Society invites nominations for a number of awards described on its Web site, and the nominations for the year 2003 are presently open.

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