CC/NUMBER 28
JULY 9, 1979

This Week's Citation Classic

Geller S, Williams H J, Espinosa G P & Sherwood R C. Importance of intrasublattice magnetic interactions and of substitutional ion type in the behavior of substituted yttrium iron garnets. *Bell Syst. Tech. J.* **43**:565-623, 1964.

A model is given to account for the static magnetic behavior of substituted yttrium iron garnets. The model is supported by a wide range of experimental results. The importance of intrasublattice interactions and of the type of ion substituted for trivalent iron, especially in the high substitution regions, is clearly demonstrated. [The *SCI*® indicates that this paper has been cited over 125 times since 1964.]

S. Geller
Department of Electrical Engineering
University of Colorado
Boulder, CO 80309

July 5, 1978

"This paper is one of 52 on garnets that I have published, mostly with collaborators, of whom there have been twenty. Most of the papers originated at Bell Laboratories, seventeen of them with the collaborators of the above paper. It was pioneering work on exciting materials. The garnets were not only scientifically but also technologically rich and they continue to be so. There is hardly a subsequent work on garnets which is not, in some way, related to these earlier papers.

"Originally, we had intended to publish several separate papers on the content of this particular paper. However, as the work progressed, the model to which reference is made in the above abstract emerged. Further definitive experiments suggested by the accumulating results were carried out. Finally, we had a clear picture, but the paper we wrote was very long, even though rather tightly written. Therefore, we decided to submit it to the widely read *Bell System Technical journal.*

"I am grateful for this opportunity to write personally about this early work and the particular institution and people involved. Had the physical research department at Bell Laboratories been Utopia, I would not have left it, but here I wish to praise Bell Laboratories. The attitude of the management was to encourage outstanding creative work. Earlier work by M.A. Gilleo,[1,2] J.P. Remeika[3] and me[4-8] on the rare earth perovskites, which did not appear to have any practical consequences, led to the discovery at Bell Laboratories by Gilleo and me, of yttrium iron garnet[9] Also, the *first* observation of 'bubble domains' was made by R.C. Sherwood[10] in crystals of rare earth orthoferrites grown by J.P. Remeika,[10] and on which Gilleo and I had done magnetization[1] and structural studies[4] respectively. The first orbited active satellite, Telstar, had a garnet-based device on it.[11] Today there are many devices using garnet materials. Among the most important are logic and memory devices utilizing bubble-domain garnet films on nonmagnetic garnet substrates. Thus, I can say from first hand experience, that fundamental research carried out in a highly creative atmosphere such as existed (and still exists) in the research department at Bell Laboratories led to important technology.

"Without the collaboration of Howell Williams and Dick Sherwood, who worked with him on the magnetic measurements, and of Gerry Espinosa who prepared most of the polycrystalline specimens, the work could not have been accomplished. Howell Williams is gone; he was one of the kindest and ablest people I have ever known."

1. **Gilleo M A.** *J. Chem. Phys.* **24**:1239-43, 1956.
2. **Gilleo M A.** *Ada Cryst.* **10**:161-6, 1957
3. **Remeika J P.** *J. Amer. Chem. Soc.* **78**:4259-61, 1956.
4 **Geller S.** *J. Chem. Phys.* **24**:1236-9, 1956.
5. **Geller S.** *Acta Cryst.* **9**:885-9, 1956.
6. **Geller S**. *Acta Cryst.* **10**:243-51, 1957.
7. **Geller S & Wood E A.** *Acta Cryst.* **9**:563-8, 1956.
8 **Geller S & Bala V B.** *Acta Cryst.* **9**:1019-25, 1956.
9 **Geller S & Gilleo M A**. *Acta Cryst.* **10**:239, 1957.
10. **Sherwood R C**, **Remeika J P & Williams H J, Jr.** *Appl. Phys.* **30**:217-25, 1959.
11. **Varnerin L J. Cornstock R L, Dean W A & Kordos R W**. *Bell Syst. Tech. J* **42**:1817-27, I963.