Summary of Phone contact with Brent Wagner, 7/1/03

J.A.K.

The following are notes based upon a conversation with Brent Wagner, Senior Research Scientist at the Georgia Research Institute (GRI), Phosphor Technology Center of Excellence, as forwarded to hin by Mike Harris, Chief of the Optoelectronics, Materials and Chemical Sciences Division at Georgia Tech, Atlanta, GA.

My email question of Mike Harris was:

> We have a need for a very fast phosphor that will be excited by low energy X-rays, about 10 keV, and should emit in the visible, but the exact wavelength is not very important. This will be for tuning the e+ ring at SLAC (Stanford Linear Accerator Center) in the e+e- collider PEPII. We would like to have a phosphor with decay times of a few nanoseconds; the incident radiation is synchrotron radiation from a bending magnet, and has, therefore, a very broad spectrum. Do you know of any such phosphors?

This email was forwarded to Brent Wagner, who was helpful on the phone and promised to forward additional material (which I have not yet received). Some relevant pieces of information from him I have collected below:

- Several other groups are interested in fast phosphors, including Bechtel (Las Vegas?), and LLNL (?).
  At LLNL, Perry Bell has done on very fast gated image intensifiers/microchannel plates, and probably at time scales of interest for our application.
- There are certainly a number of phosphors that should be responsive to X-rays in our energy range, with decay times as short as 200 ps. Cerium-doped Yttrium Silicate has a 10 ns decay, but there are several other possibilities.
  Another possibility is gadolinium silicate/Ce. As can be deduced, the Ce is the necessary ingredient for photon emission.
- Other phosphors mentioned are: ZnO/Ga and CdS/In: I don't know the decay times.
- At the GRI, a low energy electron beam is used to excite the phosphors.
  The deposition can be done by a "screen print" (?), or the way photocathodes are put on PMTs: put the substrate (glass, plastic, ...) at the bottom of a bucket of water, and sprinkle the phosphor powder on the surface: I'm told the phosphor will drift down and stick to the substrate in a uniform manner. Sometimes a vehicle such as water glass (sodium silicate) is used to suspend the powder and help it adhere.
- Today, Brent left a message for me about a paper published by Steve Derenzo and Bill Moses here at LBL, entitled 412 Inorganic Scintillators, that sounds very interesting: measurements were done using 20 keV SR, Brent says. I just tried to call each of those people, and could only leave a message. Tomorrow I will try harder.
  I also tried to call Perry Bell, w/o success, but left a message.