Transparent OSU-Compliant Polycarbonate Copolymers Gary C. Davis, Moitreyee Sinha, Mike Takemori, Katherine Jackson, William D. Richards, Robert Colborn, Amitabh Bansal, Irene Dris, GE Global Research, Niskayuna, NY; Paul Sybert, Jianbo Di, Constantin Donea, Randy Myers*, Ralph Buoniconti*, GE Plastics, 1 Lexan Lane, Mt. Vernon, IN, *GE Plastics, 1 Plastics Ave, Pittsfield, MA; Karen Hills*, Gregory Bell, The Boeing Company, Material and Process Technology, Renton, WA, *The Boeing Company, Payloads Concept Center, Everett, WA.

The flammability requirements for aircraft interiors include three tests: a vertical Bunsen burner test, a heat release test and a smoke test which has both toxicity and light transmission components. Historically, the heat release test, which is also known as the OSU (Ohio State University) test, is the most difficult test to pass. Historic approaches have primarily used additives for flammability which compromise transparency. Commercially available thermoplastics therefore do not simultaneously meet optical and flammability requirements. In this talk, we discuss the variables that determine the fire-retardancy of thermoplastics under OSU test conditions, which approximate aircraft cabin fires. We carried out independent experiments using the Pyrolysis flow combustion calorimetry (PCFC) test, developed by Lyon et al, that measures flammability parameters of milligrams of polymer. We validate the usefulness of this test as a quantitative measure to predict flammability performance in the OSU test. From a practical standpoint in designing new chemistries, this is a critical screening tool when limited amounts of material are available. The PCFC test also provides key understanding around the "intrinsic" thermal attributes of the material such as the specific heat release capacity. Additional factors that play a significant role in the burning of a plastic part in the OSU test are studied. These results are evaluated across a range of chemistries to understand the factors that drive correlations and anomalies between the PCFC and OSU tests. In conjunction with a group contribution model that was developed for polycarbonates to predict the PCFC flammability characteristics, this is a step towards developing comprehensive models and understanding of fire-retardancy of thermoplastics in the OSU heat release test. Finally, we review the performance of new transparent polycarbonate copolymers that pass the fire, smoke and toxicity requirements for aircraft interiors. In an earlier paper, the overall performance of these new polymers including the optical, physical, thermal and FAR properties was reported. To our knowledge these are the first polymers that have the combination of OSU 65/65 compliancy, high clarity and low color.