

## Materials Issues in High Power Accelerators

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High power accelerators present a wide array of materials issues for scientists and design engineers. Some materials considerations are unique to accelerators per se, or even to a particular accelerator design. For example, high intensity stress waves and the resulting cavitation erosion in heavy liquid metal accelerator targets are unique to accelerators where the sharpness of the beam pulse produces shock by thermal expansion. Other irradiation environment properties and materials response are more similar to those encountered in fission reactors or to those that will be experienced in planned fusion reactors. For example, the high displacement doses in the target structures of high power accelerators, produced by the impinging beam and by the resulting nuclear reaction products such as spallation neutrons, are of similar magnitude to the displacement doses experienced in high flux reactor cores and in the first walls of planned fusion reactors. In addition to the central issue of radiation effects in metallic structural alloys, accelerator designers will be concerned with radiation effects in polymers and ceramics, which may be employed as seals, sensors, or insulators, throughout an accelerator facility. Other applications place demands on materials that are not related to radiation but to other aspects of these aggressive environments, such as compatibility of materials with special purpose fluids. Examples are discussed of problems, materials research and development solutions and recent experimental and calculational results.