Additionally, it is not expected that metal foams would be seriously degraded by ultraviolet radiation or the presence of tenuous gases in near-Earth orbits. This later conclusion follows because such gases (at 300 km orbits) are extremely rarified. If the rate of reaction is assumed to be proportional to gas pressure, then the approximately 10^{-11} decrease in pressure that occurs in going from sea level to 300 km would effectively reduce reaction to a level near zero. With the reasonable assumption that chemical reaction rates will be proportional to pressure, even materials which were degraded with extreme rapidity at sea level would be only minimally affected at 300 km. It should also be pointed out that by constructing large scale space structures of reactive metal foams, the likelihood of any material reaching the surface of the Earth in the event of orbital failure would be very greatly reduced by the reactivity of these foams during reentry. Finally, in the case of Mg-Li-Al alloys, it is known that this material possesses exceptional resistance to hypervelocity impacts by small particles.[8] It is possible, therefore, that foam of such material could be considered as a hyperballistic armor material for crew quarters or other critical, permanent space installations, provided that suitable care were taken regarding the susceptibility of such foams to oxygen and water. It is worth noting also that metal foams may have substantial heat-transfer advantages compared to bumper sheet stand-off micrometeriod shielding designs.[20]

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Errata

Modeling Slag Deposition in the Space Shuttle Solid Rocket Motor

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