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# Alloy Development for Irradiation Performance

Semiannual Progress Report  
For Period Ending March 31, 1986

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**U.S. Department of Energy**  
Office of Fusion Energy

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*Pure vanadium, chromium and titanium feedstock materials have been prepared for alloy consolidation melting. Primary and secondary plasma arc melting of 350 g ingots has begun. Two flat stock rolling experiments were conducted on as-cast material. Alloy sheet delivery is planned to begin early in the third quarter.*

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Irradiation alters strength both during irradiation and following irradiation. Irradiation at low temperatures leads to hardening whereas at higher temperatures and high exposures, precipitate coarsening can result in softening. Toughness can also be adversely affected by irradiation. Failure can occur in ferritics in a brittle manner and irradiation induced hardening causes brittle failure at higher temperatures. Even at high test temperatures, toughness is reduced due to reduced failure initiation stresses.

Ferritic alloys should provide an attractive material for structural applications in a fusion reactor but the temperature regime over which they are used must be limited.

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