Symposia E1: **Materials for the Extreme Environment**

Presentation: **Poster**

Surface modification of alloys exposed to extreme environment

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Materials compatibility with extreme environments relies on their capability to maintain their integrity and properties. For materials under high temperature and aggressive media, surface properties are the most important characteristics for their functionality. A protective layer, induced on the surface, can serve as an effective barrier to the aggressive environment. The paper deals with the development of such protective and thermal barriers on the surface of two material systems under extreme conditions: (i) ferritic-martensitic steel for liquid heavy metal - cooled nuclear systems and (ii) nickel-based supper-alloy for gas turbine blades. Surface properties were improved by high-energy pulsed-electron beam surface irradiation: the melting of the surface layer was induced, with heating and cooling speeds in the range of 10^6 - 10^9 K/s. The method allows "one-shot" processing of large surfaces and/or complex configuration surfaces. The subsequent compositional changes and structural transformations in the surface layer increase the materials resistance. The paper discusses the structure and microstructure properties of the investigated materials in conjunction with their macroscopic properties (e.g. oxidation, corrosion, mechanical properties).