

1. Project Proposal Information

Project Proposal Title	The creation of surface nano-structural layers on products working at extreme loading conditions by methods of high energy influence and frictional treatment
Project Proposal Acronym	
Call Identifier	FP7-NMP-2012-CSA-6 FP7-NMP-2012-SME-6 FP7-NMP-2012-LARGE-6 FP7-NMP-2012-SMALL-6
Topic(s)	NMP.2012.2.2-3 Advanced materials for high-temperature power generation
Funding Scheme	Small or medium-sized collaborative projects – Specific International Cooperation Actions (SICA) to promote the participation of emerging economies and developing countries: Eastern partnership countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine). Consortia must include at least two participants from different Eastern Partnership countries.
Keywords	Materials that allow operation at high temperature, materials' in-service properties, corrosion resistance, erosion resistance, radiation resistance, reliability and durability, ionic conductivity and mechanical properties
Abstract (Max. 2000 words)	The project is aimed on the development of a new conceptual resource-saving technology for surface modification and recovery of machine components working at extreme conditions by creation of nanostructures coherently bounded to each other that will support the high level of service properties which cannot be achieved using the most advanced construction materials and will increase 2-3 times components service life
Project Description (Main Work Packages)	<p>A system of measures is suggested in the project which will permit to improve significantly both the mechanical properties of the structures and to increase their resistance to service loads and action of such media which cause their premature failure, namely:</p> <p style="padding-left: 40px;">- new ecologically clean technologies of deposition of filler materials and their remelting in vacuum to produce nanostructures and to increase the strength of their</p>

adhesion with a base metal;

- new combined mixtures of powder materials will be used to impart the new properties to the surfaces being treated;

- new principle of improving the properties of surface layers at high unit loads will be developed by deposition of multilayer coatings where the upper layers will bear the main loads and the intermediate layers will be damping, i.e. they will suppress and distribute the peak loads;

- new data will be obtained concerning characteristics of nanostructures of the surface layers under the conditions of the highest loads or action of special media.

The obtained results will give an opportunity to develop the bimetal coatings to use them in food, chemical and gas industries, in the development of electrical contacts, in the aircraft industry for the treatment and restoration of the surface of blades or other components of gas turbine engines, etc.

The application of original coating mixtures and combined high energy treatment technique will allow to obtain the coatings with a preassigned type of concentration and phase distributions on the hot-strength Ni and Cr – base alloys with controlled regulation of structure from nano- to microsize scale, without surface and inner defects.

The increasing alloying elements content in studied alloys in comparison with traditional steels provide high-temperature strength growth up to 1300 K and technological properties enhancement.

Development of scientific principles for creation of surface nano-structured layers supporting a high level of service properties on the products working at extreme loading conditions will allow enhance twice mechanical properties of the coating and substantially increase tribological and service properties that according to world level of

	theoretical and applied researches in this scientific direction.
Current Consortium (Partners, Organisation Types)	No
Deadline for Responses	November 2011, January 2012

2. Profile of the Partners Sought

Organisation Type	Research or Educational
Required Skills and Expertise	Materials that allow operation at high temperature, materials' in-service properties
Role in the project	Cooperation in investigations
Other Requirements	

3. Project Proposer Information

Name of the Organisation	National Technical University of Ukraine "Kiev Polytechnic Institute"
Organisation Type	Education
Country	Ukraine
Fields of Activity	Materials that allow operation at high temperature, materials' in-service properties, corrosion resistance, erosion resistance, radiation resistance, reliability and durability, ionic conductivity and mechanical properties
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Previous FP Projects Participated	No
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