Forschungszentrum Karlsruhe
In der Helmholz-Gemeinschaft

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Datum: 24.01.2006
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Ihre Mitteilung:

Dear Dr. J. Sanders,

I am writing you on behalf of the collaborators of the ISTC 2048 project. The collaborators are Ms Dr. Dolores Gómes-Briceno (CIEMAT), Ms Dr. Anne Terlain (CEA) and myself. The purpose of the project is to develop methods of improvement of the corrosion resistance of constructional steels operating in liquid-metal coolants such as Pb and Pb-Bi. Such coolants are supposed to be used in accelerator driven reactors (ADS), which are presently under development in Europe, USA and Japan for burning of radioactive nuclear waste. The corrosion problem, especially for the high loaded parts like the fuel cladding, is one of the key issues which has to be solved.

In the course of the project execution by our Russian colleagues (project executors) a method of essential improvement of the corrosion resistance of steels was developed. This very advanced and promising method is based on steel surface alloying with Al using a pulsed intense electron beam. As the result of this modification very efficient new anticorrosive barriers are formed. They efficiently work in the liquid-metal coolants for temperatures exceeding even 500 °C. This was demonstrated in a series of corrosion tests, carried out at Russian loops with a large number of flat and cylindrical specimens of European steels (316 L, 1.4970, T91).

This project is very successful and the results are important for the currently ongoing work on the European Transmutation Demonstrator, which is under development within the 6th Framework Program. Our large European project IP-EUROTRANS started April 2005 will be continued for the next 3 years. All collaborators of the ISTC2048 are strongly involved in IP-EUROTRANS in responsible positions (WP and Task leaders). ISTC2048 is strongly linked to the material tasks of IP-EUROTRANS (DEMETRA) and is recognized as a very important and complementary contribution to our needs. For example some necessary experiments in liquid Pb-loops at temperatures higher than 550°C can only be performed in Russia, because such experimental facilities are currently not available in Europe and also world wide.

Unfortunately ISTC2048 was finished in September 2005. To accomplish the very promising technology of surface protection, developed during the first three years we are convinced that the project must be extended for additional 36 month. During this second stage the technology has to be extended for the use of real full scale reactor parts, namely fuel cladding elements; to develop real fuel cladding specimens from T91 steel with overall defect-free surface alloyed layer; to estimate additional corrosion-mechanical properties of the modified surface layers in flowing Pb Pb-Bi at temperatures up to 600 °C; to check the corrosion resistance at abnormal operating conditions like very low and very high oxygen concentrations and accidental superheating; to estimate to a certain level the influence of neutron irradiation on thermal fatigue of the modified layer…..

Meanwhile SCK-CEN has agreed to join the prolongation of #2048 as collaborator and sponsor (see support letter of SCK-CEN). To express the enormous interest on the prolongation of this project FZK is also willing to give a financial support to the project (90 k€ over 3 years, 30 k€/a). With the Russian participants we have agreed to extend the overall project duration by one year (3 years instead of 2 years) keeping the overall budget. An increase of the project duration is very reasonable due to the ambitious goals of the project and ensures a good link to IP-EUROTRANS over the whole remaining project duration. The detail adaptation of the work plan has to be done after approval of the project by the financing party (EU). As collaborators of the ISTC project №2048 we will actively take part in investigations and in the evaluation of the project results. The suggested budget for additional 36 month is very reasonable and we would be very pleased about funding of the second stage of the ISTC2048 by the European Community.

Sincerely Yours,

Dr. Georg Mueller