PROCORE - FRANCE/HONG KONG JOINT RESEARCH SCHEME COMPLETION REPORT

Project Reference Number

F-HK35/11T

Project Title

Theoretical and Experimental Investigations on a Recently Discovered Phenomenon in Metals and Alloys: Recrystallization Induced Plasticity (RIP)

Particulars

	Hong Kong team	French team
Name of Project Co-ordinator (with title)	English:Mingxin HUANG Chinese:黄明欣	Dr. Anne-Françoise Gourgues
Name of Co-Investigator (if any)	English: Chinese:	
Institution or Institutional affiliation	[ ] CityU [√] HKU [ ] CUHK [ ] HKUST [ ] HKBU [ ] LU [ ] HKIEd [ ] PolyU	[ ] CEA [ ] INRA [ ] CNRS No. [ ] INRIA [ ] INFREMER [ ] INSERM No. [√] University of Mines-ParisTech [ ] Others:
Other project team members (if any)	Guowei YUAN	Dr. Olivier BOUAZIZ Prof. Esteban BUSSO Prof. André PINEAU Minghao ZHANG (PhD student)

Funding Period

	1st year	2nd year (if applicable)
Start Date	01/01/2012	01/01/2013
Completion Date	31/12/2012	31/12/2013

Objective(s) as per original application

1. To investigate whether or not RIP is an intrinsic phenomenon in various metals and alloys
2. To understand the physical mechanisms of RIP
3. To predict and model the kinetics of RIP under various conditions

[Please attach relevant document(s)]

i) Outline of proposed research and results obtained

It has been proposed to carry out Recrystallization Induced Plasticity (RIP) experiments for Fe-Ni alloys at various stresses and temperatures. EBSD and TEM experiments were also proposed. Besides the experimental works, it has been also proposed to develop a model to predict explain the experimental results. At the end of the project, both experimental and modelling works have been successfully finished and excellent results have been obtained. The results have been summarized in a journal paper which is to be submitted to the top journal in the field (Acta Materialia). Please see the attached paper.

ii) Significance of research results

The project may be the first one to carry out such RIP experiments for FCC alloys (i.e., Fe-Ni alloy) at various stresses and temperatures. The present experiments were well designed so that the microstructure of the Fe-Ni alloys can be kept during the quenching. Therefore, the microstructure of the samples subjected to RIP experiments can be observed by TEM and EBSD. Besides the new and novel experiments performed in the present project, a new physical model was also developed to understand the underlying mechanism for RIP phenomenon. In conclusion, the project have made significant experimental and theoretical contributions towards the understanding of RIP phenomenon, which is

iii) Research output

A full-length journal paper has been prepared based on the results obtained from this project. This paper will be submitted to the top journal in the field. A second jointed paper has been published.

iv) Potential for or impact on further research collaboration

The project has been successfully finished with good results. With the help of this project, the Hong Kong and French teams have known much better the strength of each team and have discussed the future collaborations. This project has definitely brought potential research collaborations. It is noted that a collaborative research proposal between the two teams has been submitted for funding application. Furthermore, during the second visit of the Hong Kong team in France, a potential collaboration on new topics on Al alloys has been discussed.