ECDE		
$H \rightarrow K H$	FC	D F

Experiment title: Ceramic-Intermetallic Composites	
Synthesis by SHS.	

number: CH713

Experiment

Date of experiment: Date of report: Beamline: Feb. 29, 2000 to: Nov. 8, 1999 from: Nov. 3, 1999 ID11 Received at ESRF: Shifts: Local contact(s): 15 Å. Kvick

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Report:

During the experiment performed in November 1999 on ID11, several compositions of the following systems were studied: Ni-Al, Ti-C, AL-Ti, Ni-Ti, Al-Ti-C, Al-Ti-Ni and Al-Ni-Ti-C.

Interestingly in the system Al-Ni-Ti-C with the composition 1:1:1:1, an intermediate phase has been observed at about the same time as the formation of TiC and before that of NiAl. This phase was seen to appear and then disappear at about 400-500 ms from the beginning of the reaction. Several phases are consistent with the obtained diffraction peaks. However, the identification of this intermediate has not yet been possible because of a lack of information such as the temperatures at which it disappears. Figures 1 and 2 represents the data obtained for this compound.

Figure 1 shows the crystallographic evolution during the synthesis. Figure 2 shows the integrated diffraction patterns during the transition; we observe the appearance and the disappearance of a peak located at 20= 7.9° which corresponds to the intermediate phase.

Some samples have been synthesized under Argon instead of air to measure the infuence of the atmosphere on the products and on the reaction speed in the bulk material. Initial results show that the atmosphere had no influence on the final product.

The surfaces of several samples have been examined by surface diffraction with a lower energy (25 keV) for comparison with published papers, in which the authors suggest bulk mechanisms from suface results. Our preliminary results seem to agree for the major products but some peaks have not been yet identified and could be oxides.

The samples were also studied by electron microscopy. Concerning the composite NiAl-TiC, the diffraction studies and the microstructure suggest a dissolution-precipitation mechanism for the formation of TiC and a liquid state reaction for NiAl.

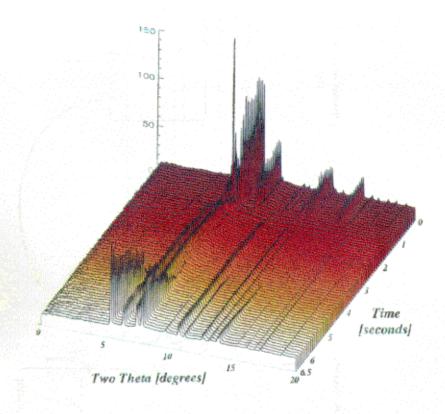


Figure 1

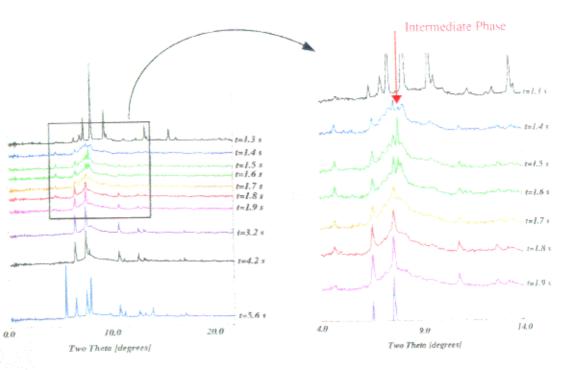


Figure 2