

Cooperation Agreement of Technological

Party A: School of Materials Science and Engineering, Shandong University of Science and Technology

Party B: Chair of Physics and Chemistry of Processes and Materials, Ugra State University

Party A and Party B on the basis of technical cooperation in previous stages and through a thorough study and market research, agree to carry out a bilateral cooperation by jointly applying for China's International Scientific and Technological Cooperation Project. The main collaboration technologies and issues are as follows:

1. Title of the Cooperation Project

R&D of porous composites and plasma coating

2. Cooperation project and main contents:

To deal with the technological problems of filters and catalyst carriers in control technologies of China's automobile exhaust emission and the design, characterization and preparation of wear and corrosion resistance coatings which are widely used in the marine engineering equipment, chemical, mining machinery, power and other industries, Party A will jointly cooperate with Party B on the following area:

(1) Porous filter materials

- 1) The porous intermetallic bulk composites prepared by SHS
- 2) The porous TiB₂-TiC-NiAl films (thickness of mm) prepared by reaction synthesis controlled by plasma for production of gradient filters.
- 3) Preparation of CNT/TiC nanostructured reinforced porous materials prepared by reaction synthesis with unequilibrium plasma heating and investigation of its physics properties.

(2) Plasma coating

- 1) Coating design
- 2) Hollow powders and forming mechanism for plasma melting and spraying
- 3) Study of rapid evaluation methods of wear and corrosion resistance combination coating
- 4) Simulation and calculation of plasma cladding and spraying

3. Distribution of Tasks

(1) Party A : to develop high efficient filtration technology, anti-abrasion porous materials technology and to solve technical problems of the filter and the catalyst carrier; to develop new alloy system of coating, characterization technology, data management system of wear and corrosion resistance coating and to solve technical problems of the multi-level and multi-scale integrated microstructures design and characterization techniques of high-throughput; to cooperate with domestic enterprises and to provide equipment of pilot production line and sites.

(2) Party B: to provide manufacturing technology of porous ceramic-intermetallic compound carrier and coating, including process, controlling technology by plasma. It will cooperate Party A to solve technical problems of the filter and the catalyst carrier; to provide manufacturing technology of wear and corrosion resistance coating, including process, controlling technology by plasma.; to solve technical problems of the preparation techniques of combination samples by plasma melting and spraying, which mainly include development of powder feeder, Development of plasma generator and controlling system, simulation and calculation of many parameters.

Matters not covered in the agreement will be discussed separately by the two parties.

4. Duration of Agreement

This agreement shall take effect once signed by both parties. The duration is 5 years, and the agreement can be prolonged by both parties in writing before its expiration.

The agreement is written in English and has four copies; each party shall keep two of them.

Party A: Dean of School of Materials Science and Engineering, Shandong University of Science and Technology (SUST)

Hong Zhilui

November 25, 2013

Party B: Head of Chair of Physics and Chemistry of Processes and Materials, Ugra State University

Pavel Bulyshev

November 25, 2013

