Prof. Jong-Jin Pak

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Ph.D. in Metallurgical Engineering and Materials Science (1987), Carnegie Mellon University
Dissertation: A Study on the Dephoshporization of Steel with Slags Containing Sodium Oxide

03/1995 - present	**Professor,** Department of Materials Engineering, Hanyang University, Korea
01/2004 - 12/2018	**POSCO Chair** for Research on Ferritic Stainless Steels Process Technology
08/2008 - 07/2010	**Associate Dean**, Graduate School, Hanyang University, Korea
03/2005 - 08/2008	**Department Head**, Materials Engineering, Hanyang University, Korea
09/1989 - 02/1995	**Researcher, Group leader**, Steelmaking Research Group, RIST, Pohang, Korea.
08/1987 - 08/1989	**Post-Doctoral Fellow**, Oak Ridge National Laboratory, TN, U.S.A.

- Steel Refinement
- Resource Recycling Using Fusion Reduction Technology

POSTECH GIFT
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Fall Semester

GIFT Seminar

Time: Nov. 7th, 4:30~5:45 pm
Location: GIFT Auditorium #101
Speaker: **Prof. Jong-Jin Pak**
(Hanyang University)
Host: Prof. Youn-Bae Kang

http://gift.postech.ac.kr

Thermodynamic analysis of sulfur control in alloy melt and slag produced from waste catalyst in petroleum refinery

The spent catalysts discarded from the petroleum refinery operations contain valued metals such as vanadium, nickel and molybdenum in the form of oxides and sulphides up to 30 mass% in total. This resource can be used as a cheap source for highly valuable metals used extensively as alloying elements in the steel industry. However, the spent catalysts also contain a high sulfur content of more than 10 mass% derived from the hydrodesulfurization processes of heavy oils.

Recently, the reductive smelting process of this resource using the carbothermic reaction and the selective vanadium oxidation process were developed to recover these metals in the form of Fe-Ni-Mo and Fe-V alloys. The process route starts with dry catalysts that are melted in an EAF at 1500-1600°C under a reducing condition. Heavy metals sink to the bottom as carbon saturated molten ferro-alloys and are separated from liquid slag containing high alumina. Alumina was originally present in the catalyst as a supporting material. The Fe-V-Ni-Mo melt is then oxidized to separate vanadium into a slag which can be processed for Fe-V alloy production by Al thermit process. The remaining Fe-Ni-Mo alloy melt after the vanadium oxidation can be used as a raw material for stainless steelmaking.

For a successful commercialization of this process, high metal recovery ratio and sulfur control in liquid Fe-V-Ni-Mo alloys in the reductive smelting process and the effective separation of vanadium from this alloy are very important. In the present work, some experimental results of our process for recycling spent catalysts will be presented together with thermodynamics of sulfur in these special alloys and smelting slags.