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Ph.D. (2009) in Materials Science & Engineering, Carnegie Mellon University, Pittsburgh, PA
Dissertation title: Surface and Interfacial Phenomena of Liquid Iron Alloys

Mar. 2009-Present	**Professor, Head,** Department of advanced materials science**, Korea Polytechnic Univ.**
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- Interfcial properties at high temperature.
- Refrcatory corrosion phenomena of Ironmaking/steelmaking
- Surface treatment of steel.

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2018
Spring Semester
GIFT
Seminar

Time: June 7th 4:30~5:45pm
Location: GIFT Auditorium #101
Speaker: **Prof. Yongsug Chung (Korea Polytechnic Univ.)**
Host: Prof. Youn-Bae Kang

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$MgAl_2O_4$ Spinel Refractory: Wetting and Corrosion Properties in contact with Molten Slags

$MgAl_2O_4$ refractories (brick and castable) are being widely used in the steelmaking process due to its low thermal conductivity, low thermal expansion coefficient and high slag resistance. However, few researches have been carried out to understand wetting and corrosion phenomena of the refractory, especially, in contact with liquid slags. The corrosion mechanisms of the refractories by liquid slags have been investigated by many researchers, and, roughly, consist of two main parts: 1) the dissolution of the refractory material into the slag and 2) the penetration of the slag into the refractory material. The penetration phenomena are considerably affected by wetting and spreading of liquid slag on refractory material. Wettability, also called dynamic wetting, is divided into two categories: non-reactive wetting and reactive wetting. In non-reactive wetting, mass transfer through the solid/liquid interface is very limited and the wetting is mostly driven by the physical forces such as inertial, gravitational, and viscous force. In reactive wetting, wettability is strongly influenced by the reaction at the solid/liquid interface. An effort to investigate the intrinsic value of wetting and spreading kinetic of $MgAl_2O_4$ single crystal refractory has been taken by using a Dispensed Drop Technique (DDT) with a high speed camera. Penetration phenomena of $MgAl_2O_4$ commercial refractory have been also studied by changing chemical composition.
Corrosion of refractory in contact with a molten slag is generally occurred due to a chemical dissolution of refractory. However, a molten slag containing MnO significantly affected corrosion phenomena of the spinel refractory. Two different corrosion phenomena of spinel refractories will be presented by Finger Rotating Technique (FRT) and the corrosion/erosion mechanism will be discussed based on spinel-slag thermodynamic consideration.

Key words: wetting, spreading, penetration, MnO containing slag, $MgAl_2O_4$ spinel, corrosion of refractory, erosion of refractory.