

# **Carnegie Mellon**

## **Materials Science and Engineering Seminar Series**

*Materials Research at Carnegie Mellon*

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### ***“Factors Affecting Heat Transfer in Strip Casting”***

Friday, April 28, 2006

11:00 A.M. Seminar in Baker Hall 136A

*Refreshments precede seminar at 10:30 A.M. in 2325 Wean Hall*

In the last few years many companies have announced the final stage of the commercial development of strip casting of steels. In strip casting heat extraction and productivity are limited by the thermal resistance at the interface between processed material and moving mould (rolls for twin-roll strip casters). Among many factors influencing interfacial heat transfer, films of various composition, either formed during casting or deposited before casting on the surface of the rolls, melt superheat and gas atmosphere composition can have a significantly positive or negative effect on the achieved heat transfer rate. From an industrial point view, methods to improve interfacial heat transfer rates must be found, in order to increase productivity.

The objective of this research project is to assess if it is feasible to improve the heat transfer rates during solidification of metal in direct contact with a copper mould, by changing composition of the atmosphere in which casting is performed and by application of thin coatings on the mould surface itself. To address this issue, solidification experiments were performed in gas atmospheres of different composition and with the mould surface either kept uncoated or coated. This talk however will focus mainly on the effects of the use of H<sub>2</sub>S in the casting atmosphere: it will be shown that this leads to improve heat transfer rates due to the decrease of melt surface tension, caused by the sulfur pick-up at the sample surface. A model, developed to quantify the effects of the use of H<sub>2</sub>S in the gas shrouding of a twin-roll strip caster, will also be discussed.

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Paolo Nolli received his bachelor degree in Materials Engineering from Polytechnic University of Milan, Italy, in 2001. He received his master degree in Materials Science and Engineering from Carnegie Mellon in 2004. He is currently a graduate student in Prof. Cramb's research group.