

## Accepted Manuscript

Title: Charting the ‘composition–strength’ space for novel austenitic, martensitic and ferritic creep resistant steels

Authors: Qi Lu, Sybrand van der Zwaag, Wei Xu

PII: S1005-0302(17)30137-8

DOI: <http://dx.doi.org/doi:10.1016/j.jmst.2017.05.004>

Reference: JMST 985

To appear in:

Received date: 14-11-2016

Revised date: 28-11-2016

Accepted date: 30-11-2016

Please cite this article as: Qi Lu, Sybrand van der Zwaag, Wei Xu, Charting the ‘composition–strength’ space for novel austenitic, martensitic and ferritic creep resistant steels (2010), <http://dx.doi.org/10.1016/j.jmst.2017.05.004>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Issue paper on New Generation steels: Processing, Microstructures and Properties

# Charting the ‘composition–strength’ space for novel austenitic, martensitic and ferritic creep resistant steels

Qi Lu<sup>1,2,3</sup>, Sybrand van der Zwaag<sup>2</sup>, Wei Xu<sup>\*1,2</sup>

<sup>1</sup> State Key Laboratory of Rolling and Automation, Northeastern University, Shenyang 110819, China

<sup>2</sup> Novel Aerospace Materials group, Faculty of Aerospace Engineering, Delft University of Technology, Kluyverweg 1, 2629 HS, Delft, The Netherlands

<sup>3</sup> China Science Laboratory, General Motors Global Research and Development, Shanghai 201206, China

[Received 14 November 2016; Received in revised form 28 November 2016; Accepted 30 November 2016]

\*Corresponding author.

E-mail address: xuwei@ral.neu.edu.cn (W. Xu).

## Abstract

We report results of a large computational 'alloy by design' study, in which the ‘chemical composition–mechanical strength’ space is explored for austenitic, ferritic and martensitic creep resistant steels. The approach used allows simultaneously optimization of alloy composition and processing parameters based on the integration of thermodynamic, thermo-kinetics and a genetic algorithm optimization route. The nature of the optimisation depends on both the intended matrix (ferritic, martensitic or austenitic) and the desired precipitation family. The models are validated by analysing reported strengths of existing steels. All newly designed alloys are predicted to outperform existing high end reference grades.

**Keywords:** Alloy design; Precipitation hardening; Coarsening rate; Solid solution strengthening; Matrix

Download English Version:

<https://daneshyari.com/en/article/7952148>

Download Persian Version:

<https://daneshyari.com/article/7952148>

[Daneshyari.com](https://daneshyari.com)