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# Specifically designed concentration profiles created by sudden velocity changes during directional solidification

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## Abstract

We investigate how macrosegregation formation during directional solidification can be purposefully influenced to form sequences of concentration gradients along rod shaped samples. The effects of sudden changes of the solidification velocity on solute segregation are systematically characterized for conditions with reduced and enhanced melt convection, respectively. We present a solidification routine that is capable of creating alloy samples with specifically designed concentration profiles that are comprised of areas with low solute concentration and peaks of steeply increasing and decreasing solute concentration. The peaks can be adjusted with respect to the concentration interval, width and individual position along the sample. These multiple graded materials are useful for the characterization of (multicomponent) diffusion processes.

*Keywords:* A1. directional solidification; A1. convection; A1. concentration gradient; A1. diffusion; B1. alloys; B1. graded material

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## 1. Introduction

During directional solidification of an alloy, the local concentration may change along the solidification direction in dependence on the partition coef-

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