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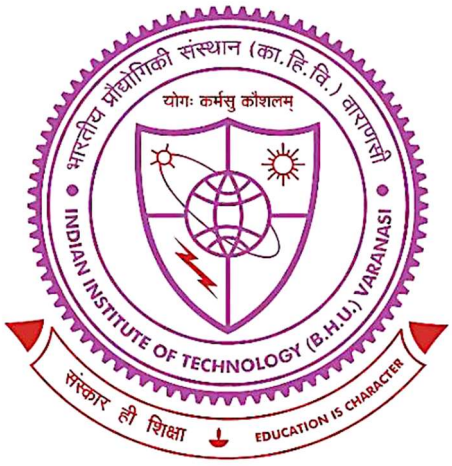

Thesis submitted in partial fulfilment for the Award of Degree

Doctor of Philosophy

By

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It is certified that the work contained in the thesis titled **"Microstructural evolution and phase stability in binary NiMn, semi-Heusler NiMnSb and V added NiMnSb multicomponent alloy"** by **"Aman Kumar Lal Das"** has been carried out under my supervision and that this work has not been submitted elsewhere for a degree.

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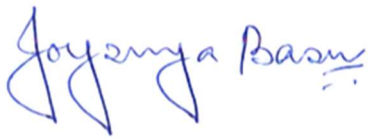

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DECLARATION BY THE CANDIDATE

I, **Aman Kumar Lal Das**, certify that the work embodied in this Ph.D. thesis is my own bonafide work carried out under the supervision of **Prof. Joysurya Basu** for a period from **July 2016** to **June 2023** at the "**Department of Metallurgical Engineering**", Indian Institute of Technology (BHU), Varanasi, India. The matter embodied in this Ph.D. thesis has not been submitted for the award of any other degree/diploma. I declare that I have faithfully acknowledged and given credits to the research workers wherever their works have been cited in my work in this thesis. I further declare that I have not willfully copied any other's work, paragraphs, text, data, results, etc., reported in journals, books, magazines, reports dissertations, thesis, etc., or available at websites and have not included them in this thesis and have not cited as my own work.

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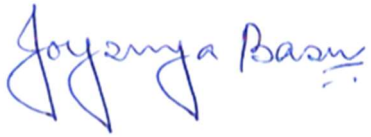

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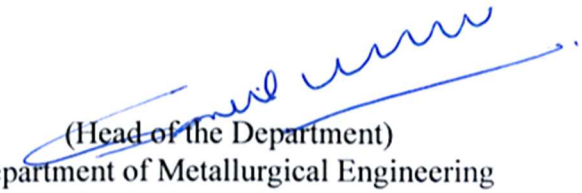

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Aman Kumar Lal Das

(Aman Kumar Lal Das)

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Abbreviations

HEA	:	**H**igh **E**ntropy **A**lloy
CCA	:	**C**omplex **C**oncentrated **A**lloy
MPEA	:	**M**ulti **P**rincipal **E**lemental **A**lloy
BMG	:	**B**ulk **M**etallic **G**lass
SPSS	:	**S**ingle **P**hase **S**olid **S**olution
HEBM	:	**H**igh **E**nergy **B**all **M**illing
STEM	:	**S**canning **T**ransmission **E**lectron **M**icroscope
CSL	:	**C**oincidence **S**ite **L**attice
GBE	:	**G**rain **B**oundary **E**ngineering
MA	:	**M**echanical **A**lloying
BF	:	**B**right **F**ield
DF	:	**D**ark Field
XEDS	:	**X**-ray **E**nergy **D**ispersive **S**pectroscopy
NBED	:	**N**ano **B**eam **E**lectron**D**iffraction
XRD	:	**X**-ray **D**iffraction
TEM	:	**T**ransmission **E**lectron **M**icroscope
SG	:	**S**pace **G**roup
FCC	:	**F**ace **C**entred **C**ubic
BCC	:	**B**ody **C**entred **C**ubic
HCP	:	**H**exagonal **C**lose **P**acked

Symbols

θ	:	Bragg angle
λ	:	Wavelength
ΔH	:	Enthalpy of formation
ε	:	Misfit strain
ΔG	:	Free energy
d	:	Interplanar spacing
a	:	Lattice parameter
^{0}	:	Degree
ϵ	:	Strain
c	:	Elastic constant
δ	:	Small fraction