

INDIAN INSTITUTE OF TECHNOLOGY MADRAS
DEPARTMENT OF METALLURGICAL & MATERIALS ENGINEERING

APDIC Report 2022

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The department has nearly 30 faculty members, whose specializations are varied. Several of them use phase diagram information in their research. We have only a limited number of research programs that focus on experimental determination of phase diagrams. However, we are one of the few departments in the country that has an active research group on computational materials thermodynamics (CALPHAD). Following is the summary of activities worth reporting to APDIC.

Workshops conducted (3)

1. Thermo-Calc Hands-on Training Course (10 h of training sessions), Organized by Department of Metallurgical & Materials Engineering, IIT Madras, in collaboration with ASM International, Chennai Chapter, January 24–28, 2022. Nearly 40 participants from industry and academia participated in the program.
2. Thermo-Calc Hands-on Training Course (10 h of training sessions), Organized by Department of Metallurgical & Materials Engineering, IIT Madras, in collaboration with ASM International, Chennai Chapter, March 15–19, 2022. Nearly 20 participants from industry and academia participated in the program.
3. Tata Steel, Jamshedpur, Thermo-Calc and Tools, (50 h of lecture), Feb 2022-July 2022 (done under Centre for Continuing Education, IIT Madras.

Publications (9)

1. Synthesis and temperature-dependent evolution of the phase composition in palladium-containing silicon oxycarbide ceramics
K Papakollu, N Moharana, KCH Kumar, S Lauterbach, HJ Kleebe, ...
Journal of the European Ceramic Society 42 (12), 4825-4834
2. Optimization of Mg Blowing Agent Content for Foaming Aluminum
K Georgy, KC Kumar, M Mukherjee
Metallurgical and Materials Transactions B 53 (2), 1089-1102
3. Diffusion Monte Carlo Study on Relative Stabilities of Boron Nitride Polymorphs
Y Nikaido, T Ichibha, K Hongo, FA Reboredo, KCH Kumar, P Mahadevan, R Maezono, K Nakano.
The Journal of Physical Chemistry C 126 (13), 6000-6007
4. Size-and shape-dependent phase diagram of Ga-Sb nanoparticles
MR Srinivaas, KCH Kumar
Calphad 76, 102389

5. Microstructure dependent ablation behaviour of precursor derived SiOC ceramic foam for high temperature applications
PV Soundaraj, SS Sembulingam, GB Thiyagarajan, N Moharana, KC Hari Kumar, Ravi Kumar
Journal of the European Ceramic Society 42 (3), 877-889
6. Mechanical characterization of spark plasma sintered titania-silicon oxycarbide (TiO₂/SiOC) nanocomposites
EW Awin, KCH Kumar, S Bernard, R Kumar
Materialwissenschaft und Werkstofftechnik 53 (2), 235-243
7. Novel class of precursor-derived Zr–La–B–C (O) based ceramics containing nanocrystalline ultra-high temperature phases stable beyond 1600° C
G Nanda, GB Thiyagarajan, KCH Kumar, R Devasia, R Kumar
Ceramics International 48 (2), 1981-1989
8. Microstructural evolution and effect of heat treatment on the precipitation and mechanical behavior of Al_{0.7}CoCrFeNi alloy
R John, M Nagini, U Govind, SRK Malladi, BS Murty, D Fabijanic
Journal of Alloys and Compounds 904, 164105

9. Evolution of phase constitution with mechanical alloying and spark plasma sintering of nanocrystalline $\text{Al}_x\text{CoCrFeNi}$ ($x = 0, 0.3, 0.6, 1$ mol) high-entropy alloys
R Bhattacharya, M Annasamy, P Cizek, M Kamaraj, GM Muralikrishna, Peter Hodgson, Daniel Fabijanic, BS Murty
Journal of Materials Research 37 (4), 959-975

Thank You