Editorial

Daniel Edward Andruczyk¹

Accepted: 14 October 2020 / Published online: 28 October 2020
© Springer Science+Business Media, LLC, part of Springer Nature 2020

The sixth International Symposium on Liquid Metals Applications for Fusion (ISLA-2019) was held from September 30th to October 3rd 2019 at the University of Illinois at Urbana-Champaign, USA, which is the Flagship Campus of the University of Illinois system. The host department was the Center for Plasma Material Interactions (CPMI) in the Department of Nuclear, Plasma and Radiological Engineering (NPRE). As the use of liquid metals in fusion devices continues to grow and gain interest over the last 20 years. Not only has their interest been in the blanket but also more and more extensively using liquid metals on the first wall and in the divertor of a fusion device. The scenarios for deploying the liquid metals fall under a couple categories:

- A. low recycling, but lower heat flux handling liquid lithium (Li) wall or
- B. a high heat flux handling yet low recycling wall using tin (Sn).

There are advantages and disadvantages to using both metals has led to the study of a third liquid metal, tin-lithium (SnLi) to take advantage of the positive properties of tin and lithium. It's this increased interest in liquid metals for fusion, in general, that has led to the establishment of a dedicated symposium to discuss all matters related to liquid metals used in fusion. The first ISLA was organized in Japan in 2010 at NIFS, The second ISLA was held in the USA hosted by the Princeton Plasmas Physics Lab (PPPL) in 2011. The third conference was in Frascati, Italy hosted by ENEA in 2013, the fourth symposium in 2015 was hosted by CIEMAT in Spain and was held at Grenada, Spain. In 2017 MEPHI hosted ISLA-5 in Moscow, Russian Federation. It is clear that the interest in using

liquid metals for fusion devices is growing. Not only was lithium (Li) covered but results with tin (Sn) and tin-lithium (SnLi) were presented. Also, some blanket technology using mercury as a surrogate were also presented.

Overall there were 45 presentations, including 19 Invited Talks and 26 Oral talks, and 16 Posters. 6 Dedicated discussion session were also included to further drive fruitful discussion among the participants. These delegates represented 12 countries from 3 continents. Presentations were based on the following dedicated topics and the sessions were organized as close as possible to these topics:

- I. Liquid Metals in magnetic Confinement Experiments,
- II. Liquid Metal Properties,
- III. Liquid Metal Technology,
- IV. Liquid Metal Laboratory Tests,
- V. Liquid Metal Theory/Modeling,
- VI. Liquid Metals in a Fusion Reactor,
- VII. Lithium Safety and Handling,
- VIII. Lithium Metal-Loop Systems,
- IX. Liquid Metals for the Breeding Blanket.

There were many contributions from the Academic community and National Laboratories as well as for the first time private fusion companies. This symposium will continue in a biennial basis, with the next symposium scheduled to be held in Hefei, China, in 2021.

The set of original articles that appear in this special issue, initially presented at the conference, have been invited as full-length, referee-reviewed papers to serve as a record for this conference.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

✉ Daniel Edward Andruczyk
andruczy@illinois.edu

¹ University of Illinois at Urbana-Champaign, Urbana, IL, USA