8th International Conference on Physical and Numerical Simulation of Materials Processing (ICPNS)

14–17 October 2016

Seattle, Washington | Hosted by Purdue University

SESSION 4: WELDING AND COATING, SALON E

Co-Chairs: Jun Qu, Oak Ridge National Laboratory; Yongping Lei, China Nuclear Power Design Company; Peng He, Harbin Institute of Technology; Yunlong Chang, Shenyang University of Technology

SATURDAY, OCTOBER 15, 2016

The phenomenon of high frequency confinement on TIG arc in TIG arc welding

Yunlong Chang, Shenyang University of Technolgy

ABSTRACT

TIG arc welding process is widely used in industry for its high welding quality, but conventional TIG welding arc has defects of heat decentralization and low efficiency, which is seldom adopted in thick plate welding, so a new method of the high frequency magnetized TIG arc welding is put forward. The experimental results show that welding arcs under an external high-frequency magnetic field have unique characters and different behaviors compared with the conventional TIG arcs, such as the distribution of arc pressure (including arc current density, etc.) forms an annular bimodal peak with the low frequency magnetic field. When adding a high frequency of the external magnetic field, the annular bimodal distribution begins to disappear unusually. Meanwhile, the arc pressure, energy density, and penetration of weld bead increase evidently. High frequency magnetized TIG shows the effect of magnetic confinement and potential applications in industry due to the high efficiency.

KEYWORDS: high frequency magnetic field, TIG arc, magnetic confinement, arc plasma