

# Diffusion bonding of high entropy alloy and stainless steel at a relative lower temperature via surface nano-crystallization treatment

Yangen Li , Heting Liao, Yuta Ebi, Taisei Sugiyama, Takashi Yajima, Rana Hossain, Yujie Jia, Shihao Zhu, Jiaqin Xu, Yusuke Nishii, Haruhi Ochi, Ayaka Satani, Souma Tanaka, Futaba Shiroto, Yuji Sato, Shuhe Shinzato, and Shigenobu Ogata

Osaka University

**Purpose:** Using diffusion bonding method to connect high entropy alloy and stainless steel at lower temperature.

**Outline:** Surface mechanical attrition treatment strategy and molecular dynamics simulation.

**Results:** Sluggish diffusion effect of high entropy alloy limits its diffusion bonding with other components in practical applications. In this paper, the surface mechanical attrition treatment strategy for performing diffusion bonding joints of high entropy alloy (HEA) at a relative lower temperature is proposed. Molecular dynamics simulations show that the apparent diffusivity of Fe in the polycrystalline model is significantly higher than in the single-crystalline model because of fast diffusion at grain boundaries, i.e., the grain boundaries are fast diffusion channels. This study provides a feasible avenue for the application of diffusion bonding in HEAs, which could greatly broaden the applications fields of HEAs.

<b>Computing system:</b>	<b>SQUID</b>
<b>node-hour:</b>	3600 node-hour
<b>memory used:</b>	50 GB
<b>parallelize:</b>	5 nodes/job

