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Effect of bio field treatment on the physical and thermal characteristics of silicon, tin and lead powders

Shrikant Patil, Mahendra K Trivedi and Rama Mohan Tallapragada
Trivedi foundation, USA

Silicon, tin and lead powders belong to group IV in periodic table and exhibit decreasing semi conducting nature towards the bottom of the group. These are very useful in producing non ferrous powder metallurgy components.

In the present investigation silicon, tin and lead powders are exposed to bio field. Both the exposed and unexposed powders are later characterized by various techniques. The average particle size, after an initial decrease is found to increase with increase in number of days after treatment although the size is lee than that exhibited by untreated powder, suggesting the operation of competing mechanisms fracture and sintering. The BET surface area increased slightly in silicon powder but did not change in tin and lead powders. SEM photographs showed that samples exposed to bio field after 20 days showed fracture paths and fractures at inter and intra particle boundaries in treated powders. Thermal analysis indicated a decrease in heat of reaction and decrease in mass in treated samples.

X-ray diffraction of the powder samples indicated both increase and decrease in crystallite size, unit cell volume and molecular weight of samples exposed to bio field even after 179 days.

These results indicate that the properties of the metallic powders can be controlled even up to atomic level by exposing to bio field.

research@trivedifoundation.org