



Foraminiferal shells under extreme shock conditions

Mariyappan Muruganatham, Vikram Sing Surendra, Jayakrishna Mekka, Ravi Bhushan, Nigel Mason, Sivaprahasam Vijayan, and Bhalamurugan Sivaraman
Pondicherry Central University, Academic and Research, Ocean Studies and Marine Biology, Port Blair, India
(vmmuruga@gmail.com)

High intensity shock tubes are generally used to mimic extreme conditions, of pressure and temperature, that prevail in impact scenarios. In our experiment we tried to simulate the condition of asteroid and meteorite impacts on early Earth organisms such as foraminifera. The survivability of foraminifera shells (made up to calcium carbonate) in such extreme conditions of pressure and temperature are least known to-date. There are several species of foraminifera and few species of them were subjected to the shock condition, they are the shallow benthic foraminifera *Calcarina spengleri*, *Sorites orbiculus* and deep dwelling planktonic foraminifera *Pulliniatina obliquiloculata* (Fig 1).

The experiment was carried out using the high intensity shock tube in PRL. The samples were subjected to shock temperatures of ~ 4000 K for 2 ms using helium as driver gas and krypton as driven gas and the foraminifera samples were kept at the end of the driven section before the end flange. After shock processing the samples were collected by opening the end flange, while physical appearance of the samples analysed by stereoscopic light microscope and it underwent powder, fragmented and turned from pure white to brown, therefore a clear indication found that the shells had undergone high temperature processing. However, it was found that certain variety of foraminiferal shells can be survive at the extreme conditions in an impact event.

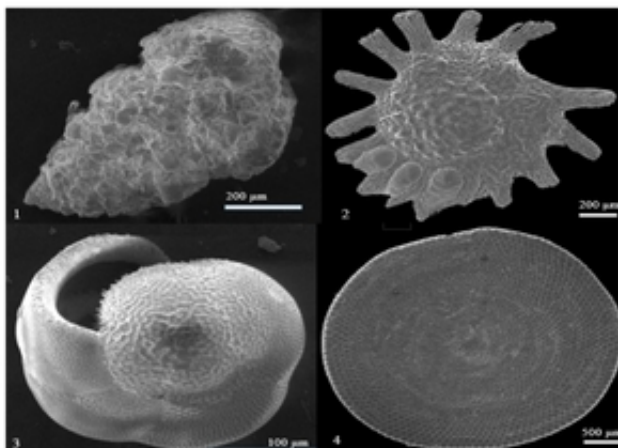


Fig 1 The foraminifera species used for experiment: 1. *Textularia* sp., 2. *Calcarina spengleri*, 3. *Pulliniatina obliquiloculata* and 4. *Sorites orbiculus*