In this issue

Scanning probe lithography

Devasish Chowdhury (**page 923**) gives an account of the latest development in various scanning probe-based nanolithography techniques with emphasis on constructive nanolithography. Various scanning probe lithography (SPL) techniques discussed are dip-pen lithography, local anodic oxidation, use of self-assembled monolayer (SAM) as resist and constructive nanolithography. He highlights a SPL technique developed by Sagiv and co-workers which differs conceptually from other SPL techniques (other SPL technique make use of either scratching, grafting or use of SAM as resist, in other words destroys the ensuing layer to make nanostructures hence are destructive in nature) and uses to create nanopatterns of chemically active groups on a highly ordered monolayer of OTS (*n*-octadecyltrichlorosilane) self-assembled on silicon, via a local electrochemical oxidation process carried out with a conducting SFM tip converting the surface exposed $-CH_3$ groups of the base monolayer to –COOH sites. In this approach, the local electrochemical oxidation is limited to the selective oxidation of only the top groups of the organic monolayer coating, the initial compact structure and molecular organization of the monolayer is thus preserved, hence the name constructive nanolithography. The tip-inscribed –COOH patterns made by 'constructive nanolithography' have high chemical, thermal and mechanical stability, which makes their use as templates in further template-assisted assembly steps. Planned nanostructures of colloidal gold particles, silver particles or semiconductor nanoparticle on silicon can be obtained via hierarchical self-assembly approach. Another technique of template-assisted assembly discussed in detail in the article is wetting driven self-assembly (WDSA). In this strategy, direct use of the wettability properties of the material is utilized to fabricate planned metal-organic surface nanostructures.

Unique bacteria from a unique environment

Magnetotactic bacteria (MTB) are perhaps the first living organisms to orient themselves with the earth's magnetic field. With their unique magnetosomes, the nanometer sized particles; these bacteria are now emerging as an attractive tool not only in nano-biotechnology but also as a probable tool in the search for extra-terrestrial life. These structures have tremendous implications in helping us understand the processes of bio-mineralization that have probably played an important role in the geological development of our planet. The Lonar lake in Maharashtra, India, is the only hypervelocity meteorite impact crater lake in basaltic rock. The lake water is characterized by high alkalinity and salinity.

The sediment samples from this lake were screened for the presence of such bacteria. The bacteria were enriched by using 'magnetic collection' method after which they were isolated by using the 'capillary race-track' method. The four isolates obtained were confirmed to be magnetotactic by using the 'hanging drop' method where they showed a typical response. On semisolid agar medium the magnetotactic bacteria showed migration towards the magnetic South Pole. The presence of magnetosomes in these bacteria was confirmed by measuring the intracellular iron content which was found to be many folds higher than that of known non-magnetotactic bacterial culture. Found mostly in the marine environment, the organisms reported here (**page 957**) have been discovered in Lonar lake, a freshwater environment.

Meghalaya's subterranean biodiversity in peril

Meghalaya is endowed with panoramic subterranean caves; yet a little is known about the biodiversity of these caves. The caves of Meghalaya attract a large number of tourists and researchers from all over the world. World-class caves are also present in Andhra Pradesh and Chhattisgarh but there are very few studies in the field of biospeleology. The field is still in its infancy and a proper knowledge to conserve/protect them is lacking.

The Government of Meghalaya is promoting quarrying and mining activities in the karst areas to raise the socio-economical status of the local tribes. However, the entire activity is not monitored by the government, resulting in unscientific and random quarrying/mining in the karst and cave areas. This has become a major concern among the nature-lovers and environmentalists as these unregulated activities could drastically damage the hypogean habitat. The warning alarm already sounded hard when India's seventh longest cave 'Krem (cave) Mawkhyrdop' of Mawmluh Cherapunjee started caving in. In this issue (**page 904**) Jayant Biswas has pointed out with photographic evidences that quarry/mining activities in the karst area directly or indirectly harm such subterranean biosphere and may lead to extinction of cave biodiversity. Biswas raised a question: should we give up all the threatened cavernicolous species at the expense of upholding the socio-economic status of the state? Possibly cave biota could be protected to some extent if some precautions could be taken while executing mining activities in karst areas of Meghalaya.