Wound healing		[114]
Wound dressing		[115]
Other applications		
Thickeners	Printing paints	[116]
Bioremediation	Waste water treatment	[117–119]
Bioremediation	Tannery effluent treatment	[120, 121]
Fertilizers		[122, 123]

14.6 Future Perspectives of Alginates

The property of alginates in forming gels by binding with various ions and its sensitivity to various environmental factors such as temperature and pH make it useful in both food and medicinal industries. Though they have been exploited in both these industries, their applications by varying their physical forms are still explored.

14.6.1 3D-Based Cell Culture Systems

A wide range of cell culture studies such as tissue engineering, drug delivery, and cell culture analysis are carried out in 3D cell cultures. Alginates are used as a cell scaffold in the development of 3D cultures of neural cells such as astroglioma cells, astrocytes, microglia and neurons [124], and human osteoblast cells [125]. Cancer stem cell (CSC) model has become one of most eminent models for assumption of tumorigenesis. A large number of limitations were found in the ancient methods where 2D cell culture model was employed. 3D cell culture plays an efficient role in CSC research and promotes discovery of various anticancer drugs. A CSC-related gene was found to exhibit higher expression level in 3D cell culture model, which has been enriched with alginates [126]. Alginates are found to be a promising candidate in the field of drug delivery. But they also pave the way for the development of devices used for drug delivery and monitoring the effect of chemicals on 3D cells. Drops of sodium alginate immersed in calcium chloride are used in designing 3D environment in electrowetting on dielectric digital microfluids [127].

A work done by Chen *et al*., [166] clearly describes about the encapsulation of mouse-induced pluripotent stem cells using alginate as core with the thin shell of Poly(L-lysine)-graft-Poly(ethylene glycol) PLL-g-PEG. This