



**Fig. 1.** Classification of hydrogels by polymerization method.

of hydrogels can be influenced by some parameters such as light exposure time, light intensity, photoinitiator concentration, monomer concentration, monomer chain length, and conjugation of various biological molecules (Fedorovich et al. 2009; Mironi-Harpaz et al. 2012).

Photocurable polymers have been extensively utilized for biomedical applications such as 3D hydrogel scaffolds, drug delivery, coatings for biosensors, and bioinks for 3D bio-printing, allowing scientists to fabricate complex, customized configurations in a facile manner (Desai et al. 2010). In addition, they have been explored for *in situ* gelling scaffolds, which can be injected into a body in a minimal invasive way because photopolymerization can convert a liquid monomer to a hydrogel that conforms to the shape of an injection site.

In this chapter, we begin with introducing photoinitiators, which play important roles in the preparation of photocurable hydrogels. Subsequently, we deal with two types of photocurable hydrogels; the first section focuses on those made from synthetic materials (Poly(ethylene glycol)diacrylate, Polyvinyl alcohol, etc.), followed by the second section on photocurable hydrogels from natural materials (collagen/gelatin, alginate, etc.).

## Photoinitiators

Photoinitiators are molecules that generate reactive species upon exposure to light, initiating photopolymerization. They exhibit high absorption at a specific wavelength of light and change absorbed light energy into chemical energy, resulting in producing reactive species. Photoinitiators are generally classified into two types (Type 1 and Type 2) by their mechanisms as presented in Fig. 2.