Owing to the removal of porogens/template and the glass softening and sintering, the volumetric shrinkage $S_{vol}$ (%) of the scaffolds was assessed for each series of samples as:

$$S_{vol} = \left(1 - \frac{V_s}{V_0}\right) \times 100$$

where $V_s$ is the scaffold volume and $V_0$ is the volume of the sample before the thermal treatment.

The total porosity $P$ (vol.%) of the scaffolds, assessed by mass-volume measurements on five specimens for each series, was calculated as

$$P = \left(1 - \frac{\rho_s}{\rho_0}\right) \times 100$$

where $\rho_s$ is the scaffold density assessed by geometrical mass–volume evaluations and $\rho_0$ is the density of nonporous glass.

The scaffolds were carefully polished by using SiC grit papers (from #600 to #4000) to obtain samples suitable for mechanical tests. The strength of the scaffolds was evaluated through crushing tests (MTS System Corp. machine, cross-head loading speed set at 1 mm min$^{-1}$) performed on five specimens for each preparation method. The failure compressive stress $\sigma_c$ (MPa) was obtained as

$$\sigma_c = \frac{L_c}{A}$$

where $L_c$ (N) is the maximum compressive load registered during the test and $A$ (mm$^2$) is the cross-sectional area perpendicular to the load axis.

In vitro bioactivity tests were carried out by soaking the scaffold in an acellular simulated body fluid (SBF) prepared according to Kokubo's protocol (Kokubo and Takadama, 2006), which is the standard solution for mimicking the human plasma. The samples were soaked for different time frames (24 h, 48 h, and 7 days) in polyethylene bottles filled with 30 mL of SBF maintained at 37°C (human body temperature). The solution was refreshed every 48 h to simulate fluid circulation in the human body. The pH variations of the SBF, induced by the ionic dissolution products released from the scaffolds, were monitored daily (SBF reference value: pH = 7.40). The modifications of the sample surface after soaking were investigated through SEM and EDS (Philips EDAX 9100) analysis.

### 16.3.2 Results and Discussion

The thermally removable organic phases used for scaffold fabrication are shown in Fig. 16.6. The polyethylene particles acting as pore formers in methods I and III are prism-shaped and range from 300 up to 600 μm (Fig. 16.6A). The polyurethane sponge used as a template for glass-derived scaffolds prepared by methods II and IV exhibits a 3D highly interconnected network of macropores