FTIR Measurement

We have performed FTIR measurement (Nicolet Avatar 330 FTIR spectrometer, England) before and after silver-ion release from cement samples into the TRIS-HCl buffer solution. The cement samples were mixed in a ratio of 1 mg of sample with 300 mg of KBr powder followed by compacting those into a thin pellet in a stainless steel die with 1 cm inner diameter. FTIR data were recorded over the range of 4000 to 400 cm⁻¹ with 128 scans.

FTIR spectra of CPC-Ag 0 wt %, CPC-Ag 0.6 wt % and CPC-Ag 1.0 wt % cement samples after 24 h of hardening process are presented on Figure S1. For all investigated cement systems, adsorbed water band was relatively wide, from about 3600 to 2600 cm⁻¹, with an explicit peak at 3570 cm⁻¹. CO₃²⁻ group vibration bands were observed in the range between 1000 and 1156 cm⁻¹, at 964 cm⁻¹, at 553–610 cm⁻¹, and at 470 cm⁻¹, which is characteristic of β-TCP [s1]. For both CPC-Ag 0.6 wt % and CPC-Ag 1.0 wt % cement samples, HPO₄²⁻ group was detected at 875 cm⁻¹ that confirms the appearance of the new DCPD phase. Furthermore, the peaks at ~800 and 1650 cm⁻¹, easily visible for the cement samples, were attributed to the bond vibration of PO₃⁻ [s2]. Therefore, it can be concluded that CaAg(PO₃)₃ was present in both CPC-Ag 0.6 wt% and CPC-Ag 1.0 wt% cement samples.

FTIR spectra of the CPC-Ag 1.0 wt% after 3 and 14 days of silver-ion release test into the TRIS-HCl buffer solution are shown in Figure S2. No CaAg(PO₃)₃ product was detected after 14 days, which is proven by the PO₃⁻ peaks, disappearing at ~800 and 1650 cm⁻¹.

![Figure S1. FTIR spectra of CPC-Ag 0 wt %, CPC-Ag 0.6 wt % and CPC-Ag 1.0 wt % cement samples after 24 h of hardening process.](image-url)
Figure S2. FTIR spectra of the CPC-Ag 1.0 wt % after 3 (1) and 14 (2) days of silver-ion release test into the TRIS-HCl buffer solution.

References


© 2016 by the authors; licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons by Attribution (CC-BY) license (http://creativecommons.org/licenses/by/4.0/).