Hydrophilic comonomer impact on poly(vinyl alcohol-co-methyl methacrylate) based hydrogel coating

Ghani, Siti Musliha Mat[a]; Rabat, Nurul Ekmi[b]; Ramli, Ros Azlinawati[c]; Majid, Mohd Faridzuan[d]; Yahya, Wan Zaireen N.[a]

[a] Chemical Engineering Department, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, Perak, 32610, Malaysia

[b] Centre for Contaminant Control and Utilization, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, Perak, 32610, Malaysia

[c] Faculty of Industrial Science and Technology, Universiti Malaysia Pahang, Gambang, Kuantan, 26300, Malaysia

[d] Fundamental and Applied Science Department, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, Perak, 32610, Malaysia

ABSTRACT

Presence of functional group in monomer chain is significantly affect the properties of finished coating. Thus, this study reports the copolymerization and behaviors of PVA and MMA with three different monomers with different functional group namely AAm, AAc and EG. Four type of hydrogel coating were synthesized via semi batch emulsion polymerization namely HAAC, HEG, HAAM and PVA-MMA. The functional groups of all coating were confirmed by FTIR spectra analysis and collapsed microgels with size less than 0.5 mm were observed grafted on the surface of hydrogel using FESEM. HAAM shows the highest water absorbency of up to 81% of its weight. Thermal decomposition showed rapid degradation rate of HEG at the initial curve compared to other coating samples. Nevertheless, due to strong bonding of carbonyl group and the carbon steel, HAAC has the highest adhesion strength of 4.0 MPa. Among HAAM, HAAC and HEG, amide has greatly improved the water absorbency, carboxyl aided the adhesion strength and hydroxyl has led to denser matrices of hydrogel coating.

KEYWORDS

Adhesion; Copolymer; Emulsion; Equilibrium water content; Functional group; Hydrogel coating

ACKNOWLEDGEMENTS
The authors thanks Yayasan Universiti Teknologi PETRONAS for the financial support under grant 0153AA-H47.