

A blowing method to form sphere of poly(3,4-ethylenedioxythiophene) : Growth from a self-assembled simple synthesized by aqueous chemical polymerization

Chanhyuk Jee, Ji-Hong Bae, WonBin Lim, Byung Joo Kim, Jin Gyu Min, Chang Min Seo and PilHo Huh*

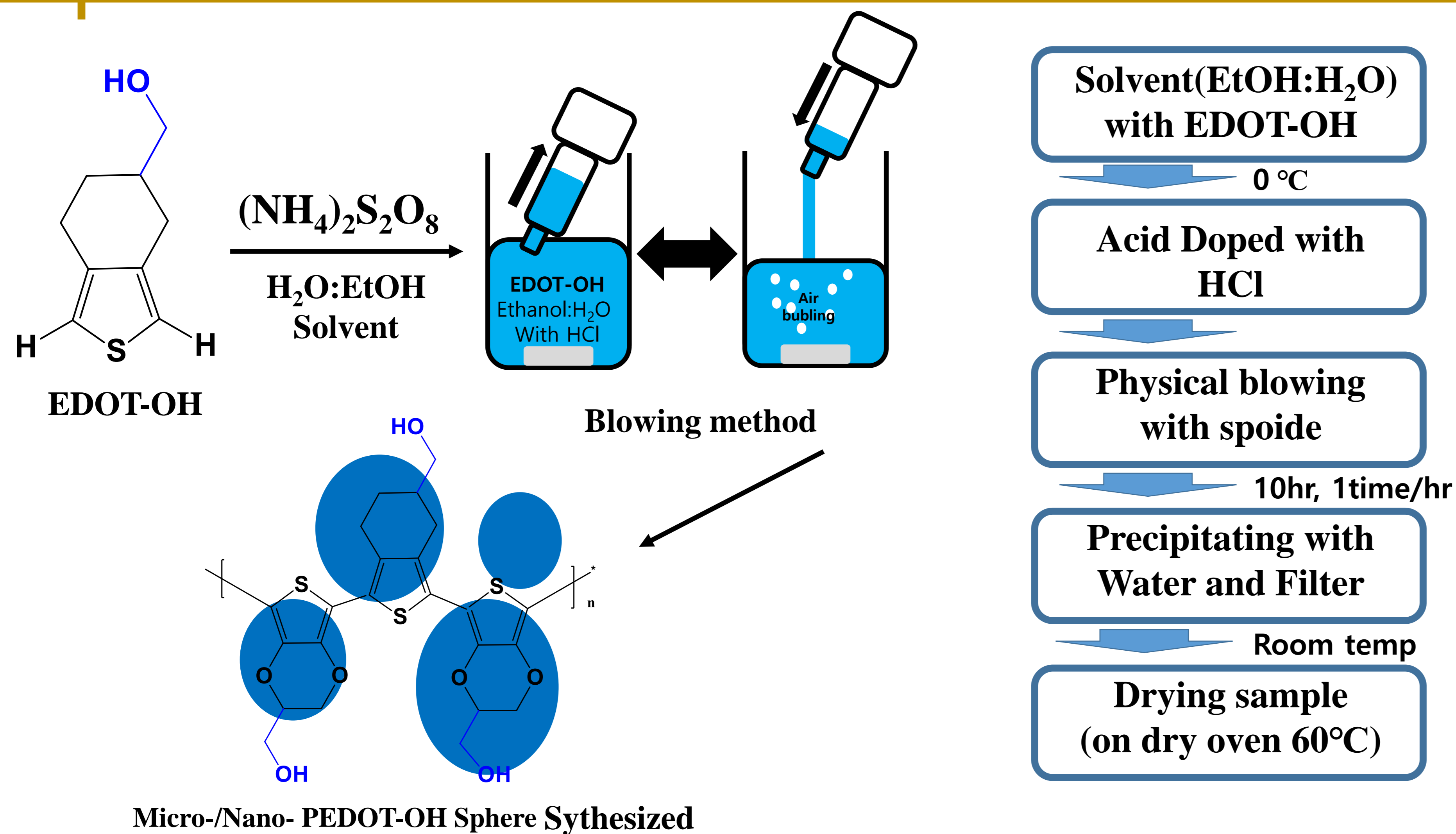
Advanced Steric polymer laboratory, Pusan National University
Busan 609-735, Republic of Korea

Abstract

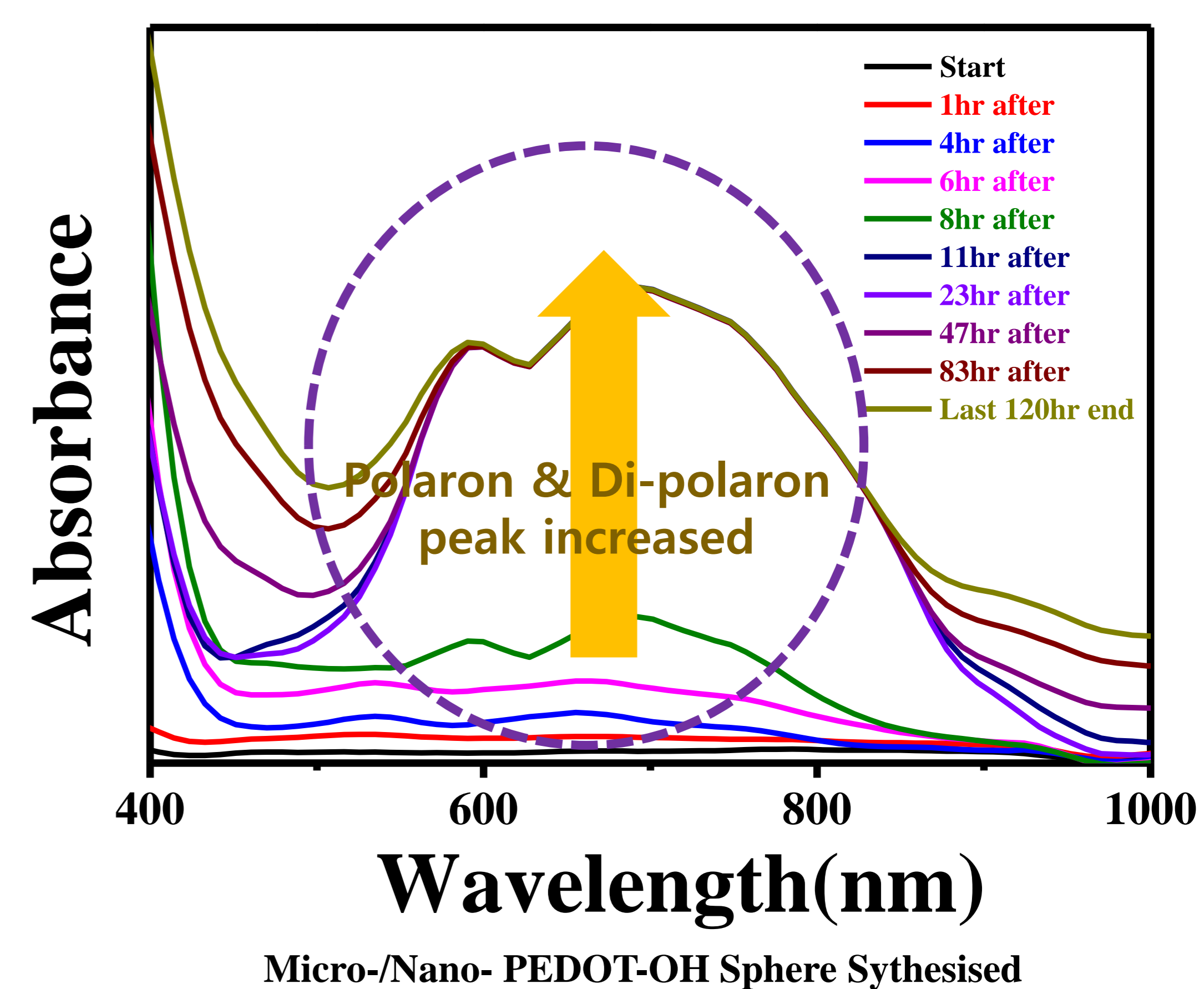
Various micro-/nano- sized diameters sphere morphology accompanied with self-assembled by simple blowing method of hydroxyl-poly(3,4-ethylenedioxythiophene)(PEDOT-OH) doped with hydrochloric acid were synthesized in aqueous solution using different added amount of chemical initiator APS(ammonium persulfate as oxidant). Approved with scanning electronic microscope images sphere morphologies and indicated effect of add amount initiator and blowing for controlled chemical bonding.

Discuss this study of self-assemble synthesized of PEDOT-OH with in-situ UV and SEM. It was found that sphere morphologies of PEDOT-OH was driven the hydrogen bond between EDOT(3,4-ethylenedioxythiophene) hydroxymethyl derivative monomer, hydroxymethyl EDOT. Moreover, in blowing condition, controlled synthesis speed was one of factor to sphere morphologies with PEDOT-OH

Experiment



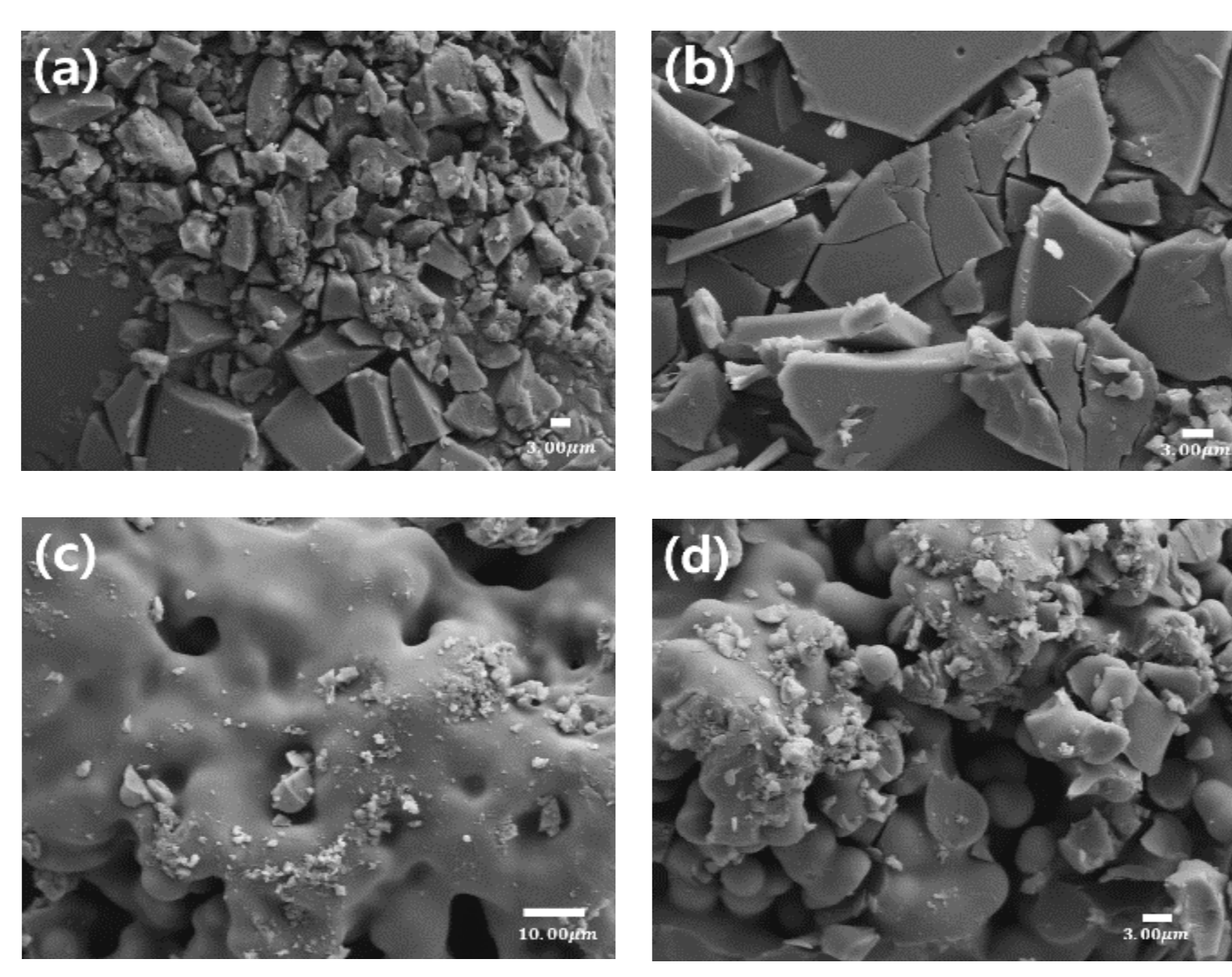
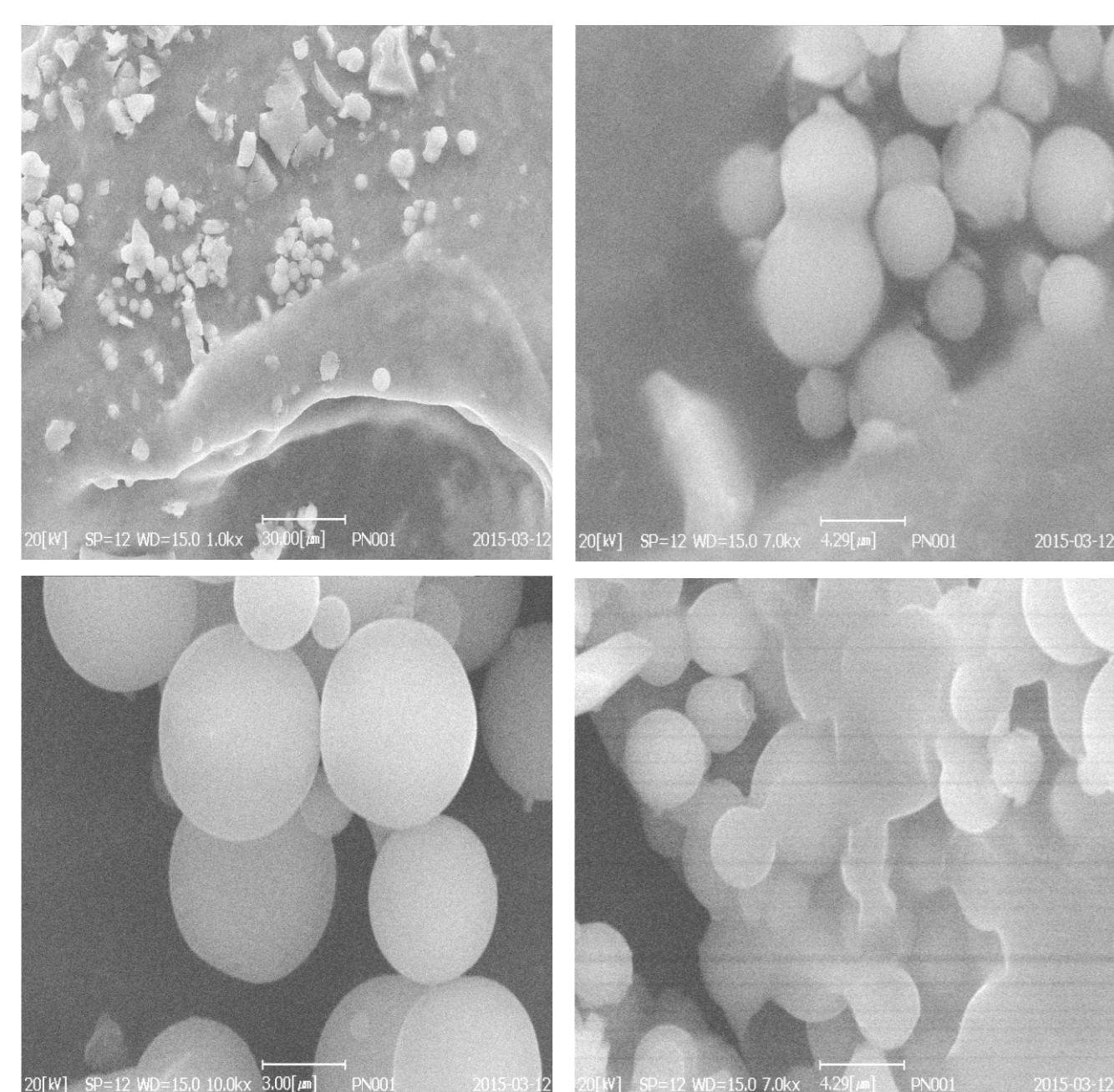
In-situ UV



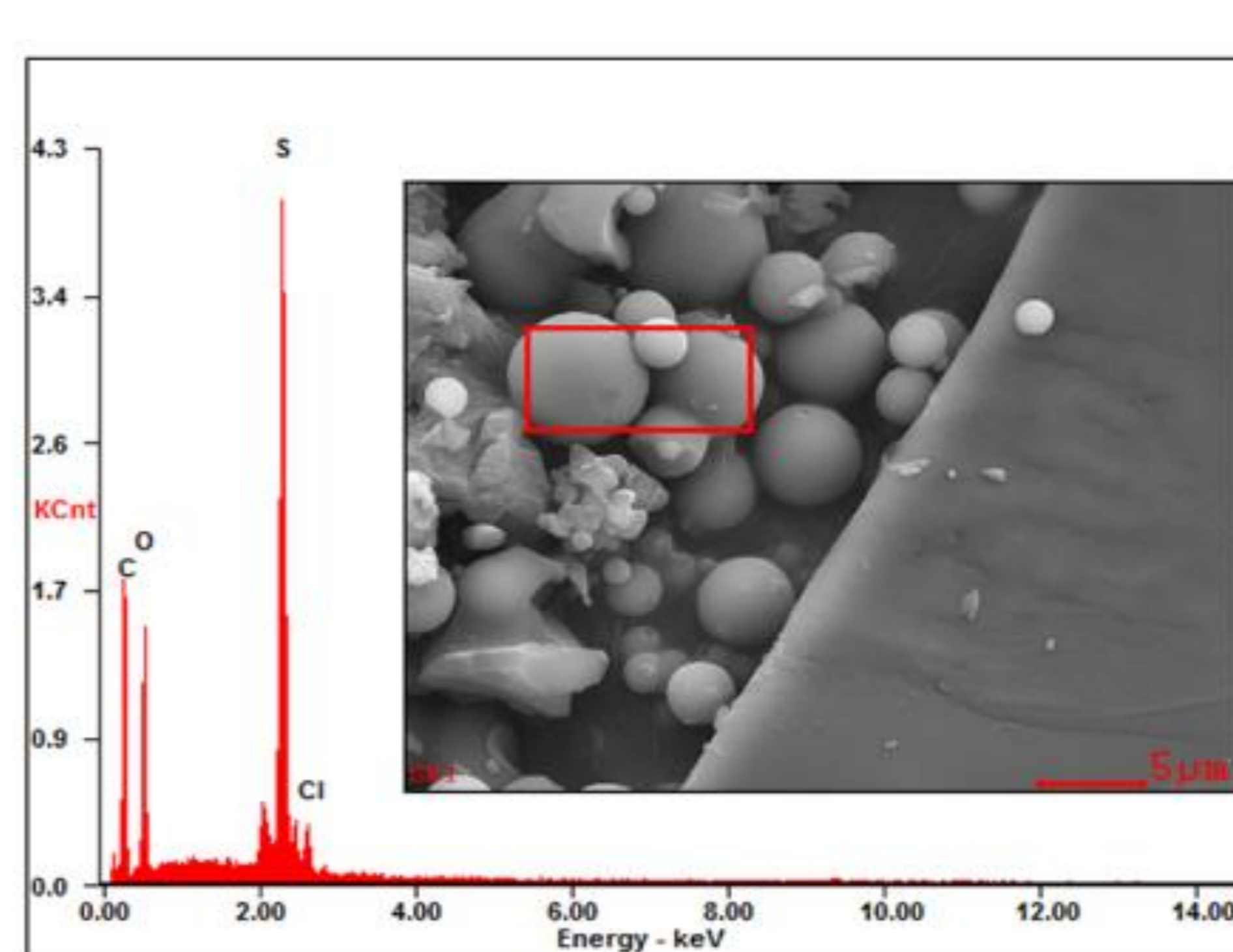
n-SEM

FE-SEM

EDS



(a-b) same condition compared with figure 1. without blowing method during polymerization. (c-d) Figure 1's samples investigated through FE-SEM.



Element	Wt%	At%
CK	51.38	65.98
OK	22.24	21.44
SK	24.19	11.64
CIK	02.19	00.95
Matrix	Correction	ZAF

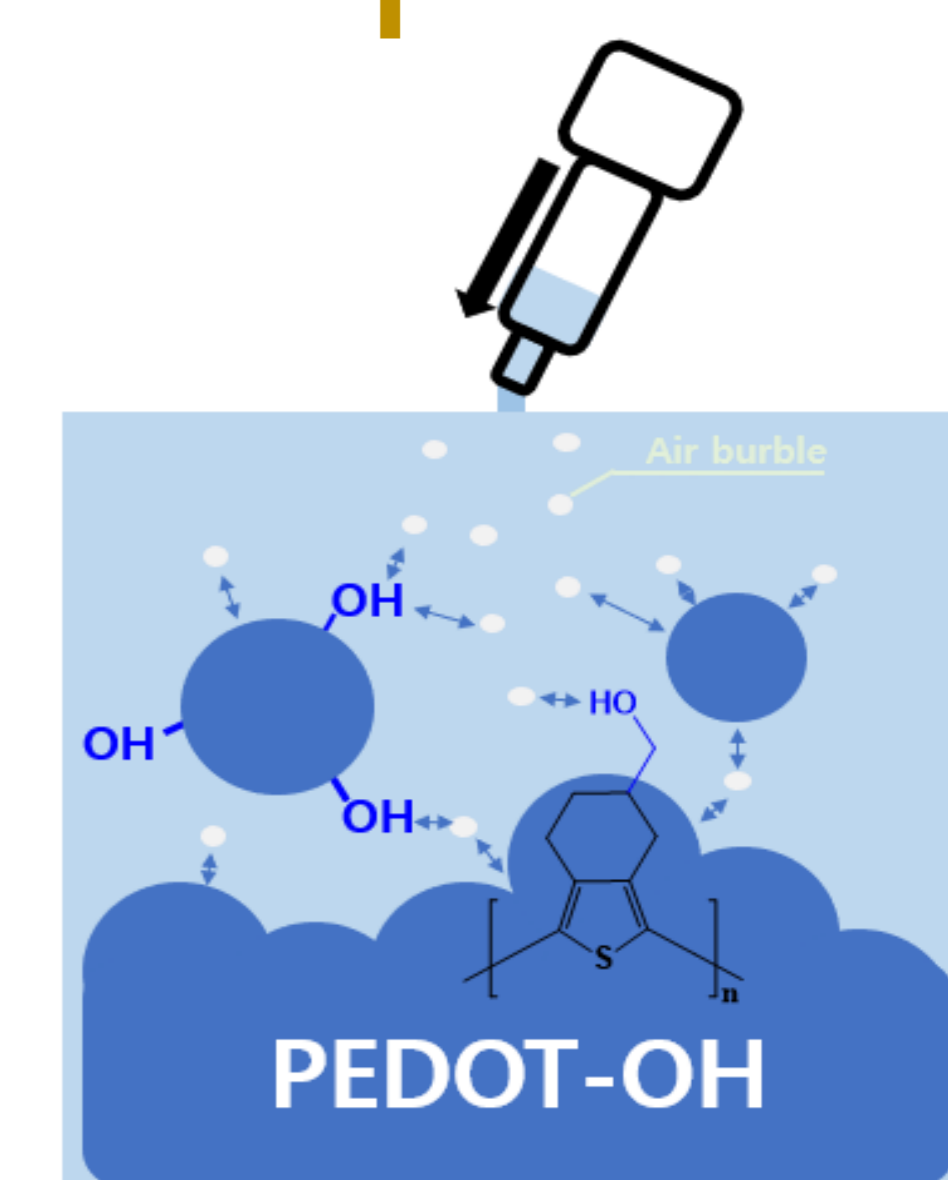
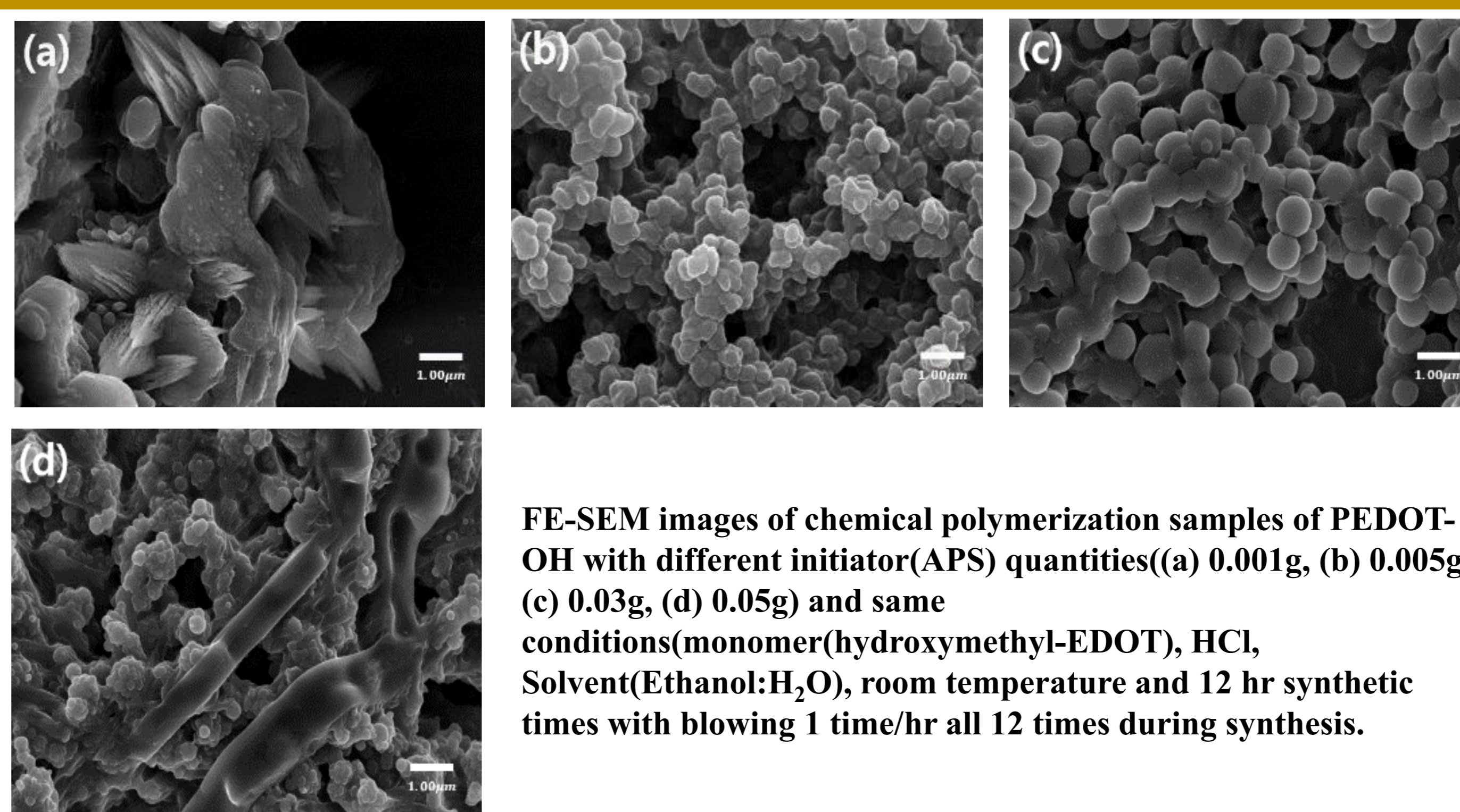
Scheme

FE-SEM

Principle

Name	APS (Ammonium persulfate)
A	0.001g
B	0.005g
C	0.03g
D	0.05g

All of samples have same condition that On Room temperature, EDOT-OH(monomer) Solvent(EtOH:H₂O) and synthesis time 12hr with blowing 12times per hour



Concept image of PEDOT-OH's sphere shape morphology on chemical synthesis used hydrogen bonding with air bubble through blowing method.

Conclusion

1. All the sphere shape PEDOT-OH's hydroxyl groups effected hydrogen bonding with air bubbles and solvent during chemical synthesis.
2. Satisfied with clearly control sphere shape morphology of PEDOT-OH needed accurate control synthetic rate(initiator density) and presence or absence of air blowing.

Acknowledgement

This work was supported by the the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIP) under Grant number (201611420003)

