

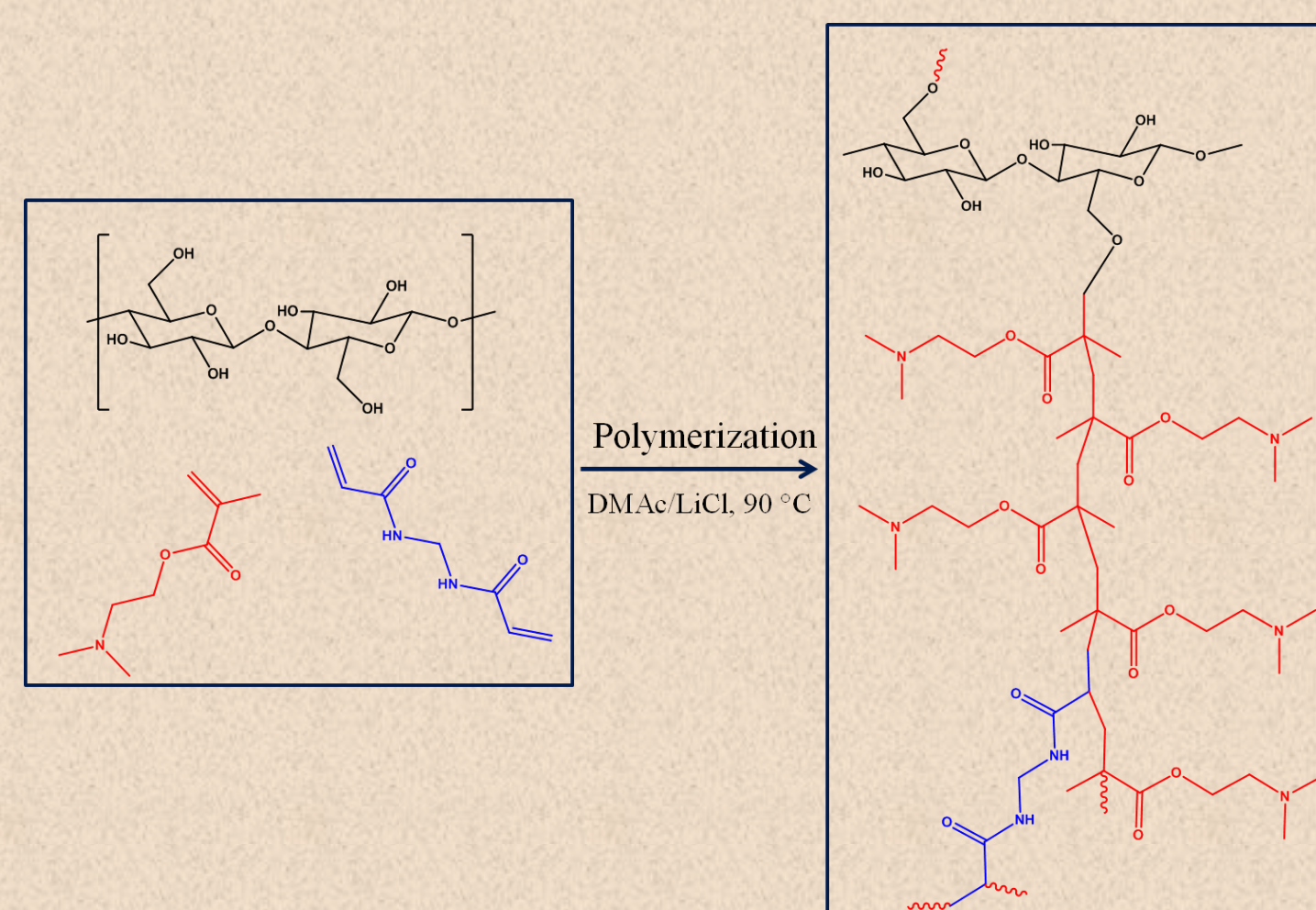
SWELLING PROPERTIES OF CELLULOSE-*g*-PDMAEMA HYDROGELS STUDIJA BUBRENJA CELULOZA-*g*-PDMAEMA HIDROGELOVA

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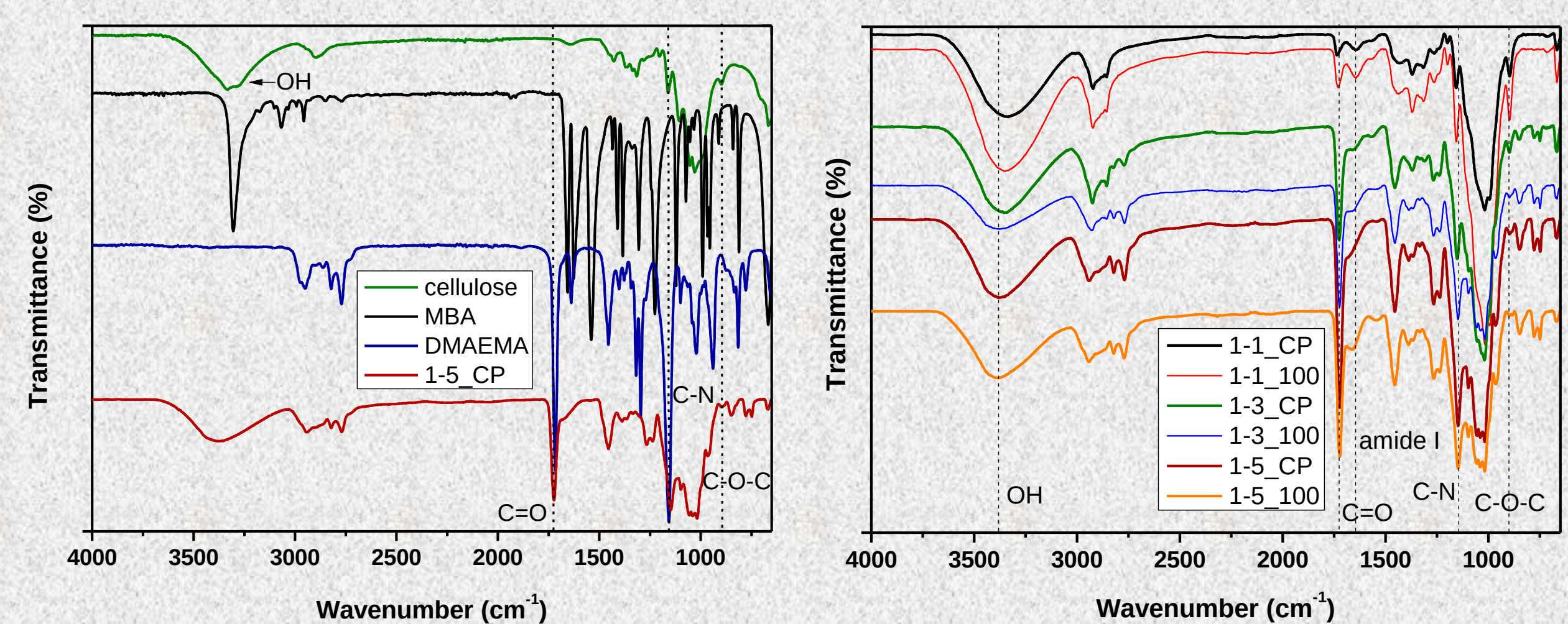
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Hydrogels possess unique properties in terms of porosity, swelling, mechanics, even biological responses that make them relevant to a broad range of potential applications. One of the ubiquitous hydrogels is the extracellular matrix (ECM) characterized with water-swollen fibrillary three-dimensional (3D) networks. In this work, hydrogels are prepared from PDMAEMA grafted onto cellulose (Cel-*g*-PDMAEMA) (cellulose:DMAEMA = 1:1, 1:3 or 1:5) and crosslinked with *N,N*-methylenebis(acrylamide) *i*) via chemical synthesis or *ii*) by additional irradiation (10, 30 or 100 kGy). The hydrogel spheres have been prepared and their swelling kinetics was studied in deionized water at 20 °C for 14 days. Structure of synthesized hydrogels was characterized by FTIR. Morphology of the Cel-*g*-PDMAEMA hydrogel spheres was studied by SEM. with *N,N*-methylenebis(acrylamide) *i*) via chemical synthesis or *ii*) by additional irradiation (10, 30 or 100 kGy).

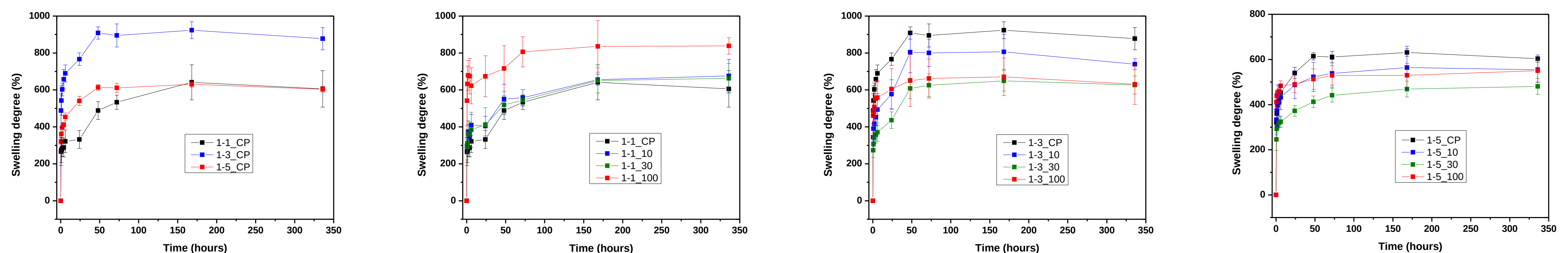
Synthesis of hydrogels



Infrared spectroscopy of prepared hydrogels

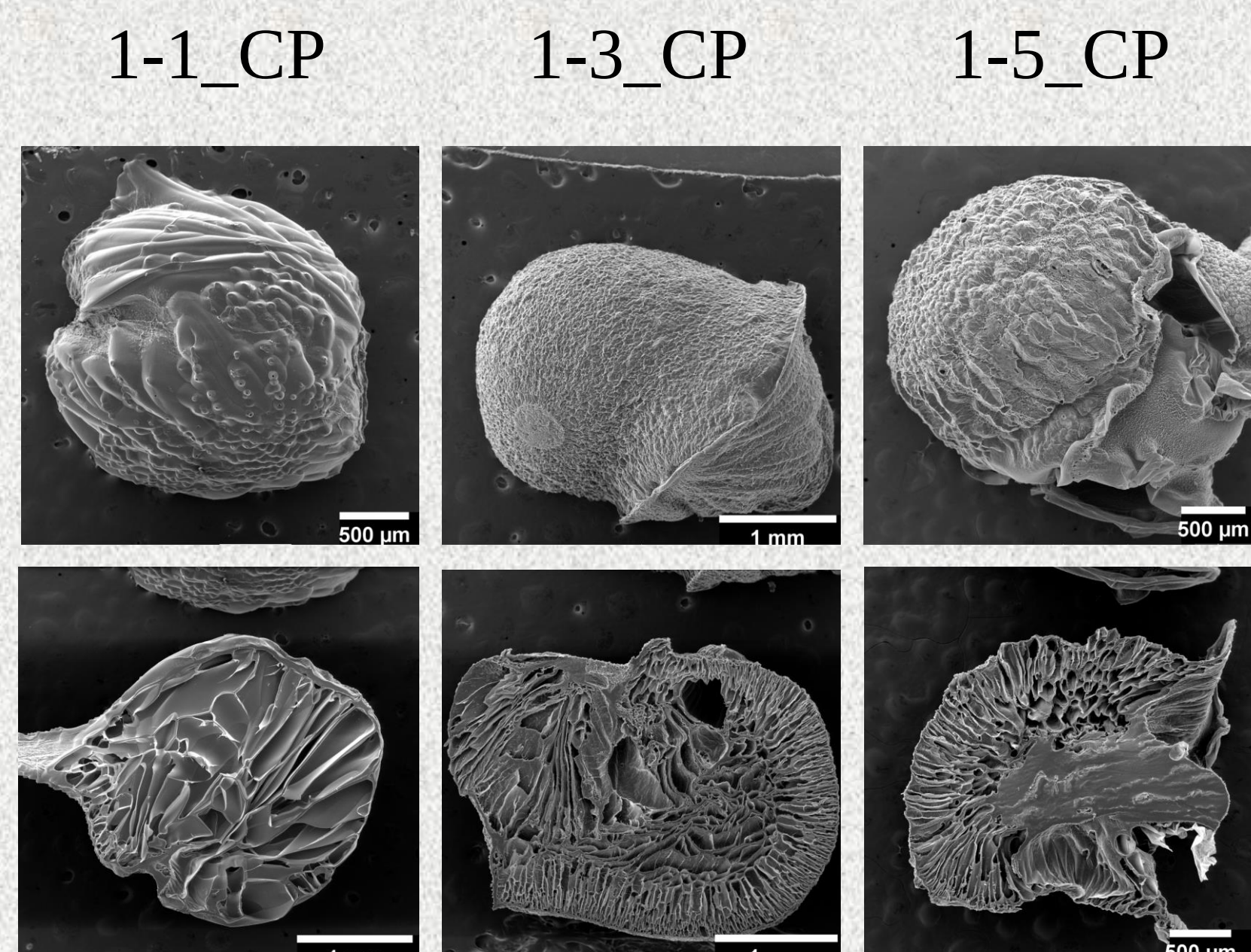


Swelling degree of cellulose-*g*-PDMAEMA hydrogels

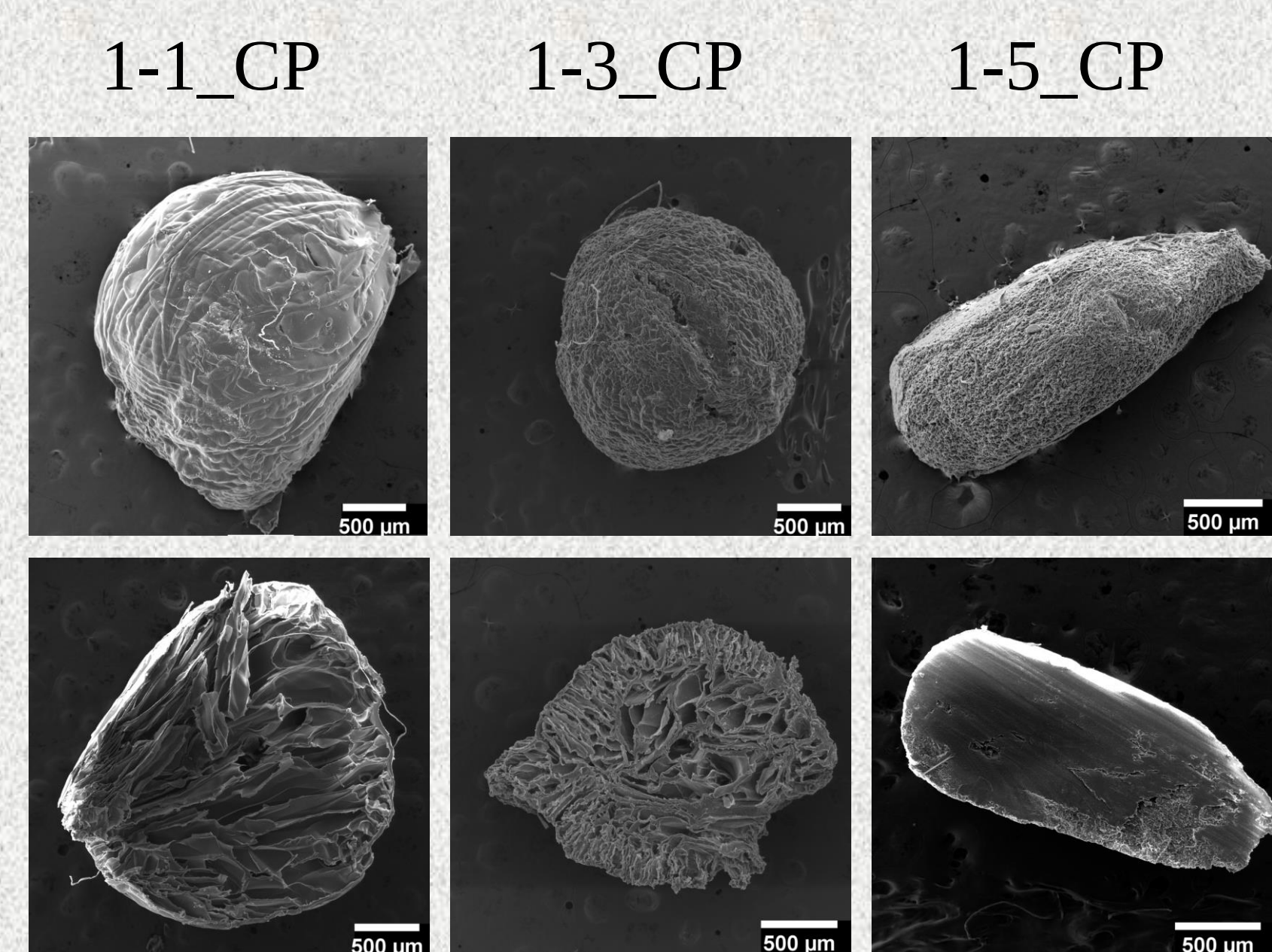


Morphology of prepared cellulose-*g*-PDMAEMA spheres

Initial spheres



Spheres after long period of swelling



Conclusion

- Gamma irradiation has been shown to increase the PDMAEMA content in hydrogels
- Hydrogels prepared by chemical synthesis showed large equilibrium swelling (600 to 900 %)
- The samples with the lowest amount of PDMAEMA (1-1_CP) reached the maximum swelling degree in seven days while those with higher amount of PDMAEMA (1-3_CP, 1-5_CP) reached the maximum swelling degree in two days
- PDMAEMA probably contributes to faster swelling in two ways: it affects the structure and porosity of the materials
- After reaching equilibrium, samples 1-1_CP and 1-5_CP displayed similar swelling degree of ca. 640 % while the highest α of ca. 925 % displayed sample 1-3_CP. Probably poor porosity of sample 1-1_CP and a porous outer layer vs. a compact non-porous central part in sample 1-5_CP caused a similar swelling while sample 1-3_CP showed a very porous structure throughout the cross-section of the sphere