

PHOTOINDUCED STEP-GROWTH POLYMERIZATIONS

Erdem Sari^a, Tugba Celiker^a, Busra Nakipoglu^a, Kerem Kaya^a, Cem Kiliclar,
Sermet Koyuncu^b, Gorkem Yilmaz^a, Yusuf Yagci^a

^a Istanbul Technical University, Department of Chemistry, Maslak, Istanbul 34469,
Turkey

^b Canakkale Onsekiz Mart University, Department of Chemical Engineering,
Canakkale, 17100, Turkey

There has been an increasing interest in the development of novel synthetic strategies for the preparation of step-growth polymers as they still hold the major fraction of plastic fabrication. Particularly, light-induced approaches [1] has gained growing interest since its unique advantages have been more clearly realized. Our contribution to the light-induced step-growth polymerization mainly focused on the synthesis of conjugated polymers using onium salts as oxidizing agents. We have shown the synthesis of polythiophene [2] and polythienothiophene derivatives using onium salts as oxidizing agents. In a previous work, we have shown the photo-induced polymerization of *N*-ethyl carbazole [3], pyrene [4] using diphenyliodonium hexafluorophosphate. Spectral analysis proved that upon light irradiation, there is a single electron transfer from the monomer to the onium salt, which yields the radical cation species of the former that produces the corresponding polymer after steps of coupling and electron transfer reactions. In a following study [5], a phenacyl salt of *N*-ethylcarbazole is prepared, which yields poly(*N*-ethylcarbazole) upon light exposure even when no onium salt is employed. We have also demonstrated that it is possible to prepare conventional polycondensates [6] such as polyesters, polyethers, [7] polyamides and polyurethanes by light-induced strategies.

[1] Yilmaz G., Yagci Y., *Progress in Polymer Science*, 2020, 100, 101178

[2] Yagci Y, Yilmaz F, Kiralp S, Toppare L. *Macromolecular Chemistry and Physics*, 2005:206, 1178

[3] Sari E., Yilmaz G., Koyuncu S., Yagci Y., *Journal of the American Chemical Society*, 2018, 140, 40, 12728

[4] Celiker T., Kaya K., Koyuncu S., Yagci Y., *Macromolecules*, 2020, 53, 5787-5794

[5] Kaya K., Koyuncu S., Yagci Y., *Chemical Communications*, 2019, 55, 11531.

[6] Nakipoglu B., Yilmaz G., Yagci Y., *Polymer Chemistry*, 2019, 10, 5652-5658.

[7] Kiliclar HC, Yilmaz G, Yagci Y, *Macromolecular Rapid Communications*, 2021, <https://doi.org/10.1002/marc.202000686>