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Biobased Derivatives From Olive Oil for Tuning Physically Crosslinked Poly(Vinyl Alcohol) Hydrogel Properties

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Vegetable oils, commonly discarded by kitchens and restaurants, comprise unsaturated triglycerides, and the double bonds present in triglyceride units can be readily converted into interesting precursors through various synthetic methods.[1] In this contribution, we present a straightforward chemical methodology for the revalorization of cooking oil, towards using waste vegetable oil as a source to produce new building blocks for various applications. Specifically, the epoxidation of olive oil primarily yields an epoxidized oil derivative. This same epoxidation pathway can be applied to generate hydroxylated derivatives, such as diols.

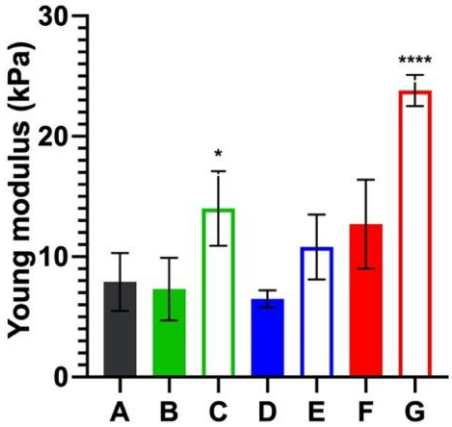

Figure 1. Compressive Young's modulus (kPa) PVA-based hydrogels prepared using 10 wt% PVA (A), 10 wt% PVA in the presence of 1 (B) or 5 wt% (C) of olive oil, 1 (D) or 5 wt% (E) of epoxidized olive oil, and 1 (F) or 5 wt% (G) diol olive oil derivative, respectively. Significant differences (95% confidence interval) are denoted as follows: *$p \leq 0.05$, **$p \leq 0.01$, ***$p \leq 0.001$, ****$p \leq 0.0001$.

In conclusion, these oil-based derivatives were then incorporated into the formulation of physically crosslinked PVA hydrogels. Notably, hydrogels containing a 5 wt% diol derivative exhibited the highest compressive Young's modulus, suggesting a significant interaction between PVA and the diol (Figure 1).[2]

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1. B. R. Moser, S. C. Cermak, K. M. Doll, J. A. Kenar, B. K. Sharma, *J. Am. Oil Chem. Soc*. **2022**, *99*, 801–842.
2. F. Werlinger, V. Cárdenas-Toledo, P. Uribe, S. Oyarzo-Aro, V. Mayorga, J. L. Obando, A. Concha-Meyer, A. Pereira, J. Martínez, O. S. Trofymchuk, M. E. Flores, *J. Appl. Polym. Sci.* **2025**, *142*, e57249.