Simpler and more efficient strategy to stabilize the chromophore orientation in electro-optic polymers with copper-free thermal Huisgen reaction

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Résumé en anglais	A new strategy is proposed to stabilize the electro-optic (EO) activity of second-order materials using copper-free thermal Huisgen 1,3-dipolar cross-linking reaction. It consists in freezing the chromophores orientation after the poling process by a cross-linking reaction based on the 1,3-dipolar cycloaddition between an azide and an alkyne. To reach this goal, the synthesis of new methacrylate type polymers bearing a derivative of Disperse Red 1 chromophore was performed. The polymeric structure is bearing a cross-linkable function on its backbone and the complementary reactive function is brought by a small molecule called “doping agent” **(DA)**, containing several complementary cross-linking groups, evenly distributed in the polymer film. Materials have been prepared and exhibit large second-order nonlinear optical coefficients (d_{33}) up to 60 pm/V at the fundamental wavelength of 1064 nm. Moreover, the thermal stability of the orientation of the chromophores could reach 150 °C upon cross-linking with such materials, which is higher than previously described cross-linkable EO polymers based on this reaction. Furthermore, this new strategy widens the possibilities offered by copper-free thermal Huisgen 1,3-dipolar cycloaddition as cross-linking reaction for EO polymers.
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