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On the strain-induced structural evolution upon uniaxial stretching of Poly(VinyliDene Fluoride): influence of secondary crystals and crystalline relaxation JULIETTE DEFEBVIN, SOPHIE BARRAU, GRÉGORY STOCLET, JEAN-MARC LEFEBVRE, Umet-Université Lille1, POLYMER ENGINEERING SCIENCE TEAM — Development of more efficient piezoelectric devices tends to innovate and create materials able to combine flexibility and electromechanical conversion. Poly(vinylidene fluoride) (PVDF) is a semi-crystalline polymer that exhibits interesting piezoelectric properties. Besides PVDF is able to convert a mechanical solicitation into an electric energy and vice versa. However these physical properties are highly dependent on the polymer crystal structure. PVDF presents at least two main crystalline forms. The most common phase is the α-phase that is non-polar. On the other hand, the β phase is the most polar one and it can be obtained by a stretching of the α-phase. Knowing the influence of the drawing conditions on the strain-induced structural evolution is thus of prime interest. To assess this point the strain-induced structural evolution of PVDF, stretched under different conditions, has been followed in-situ by means of WAXS/SAXS experiments. As a main result, this study shows that drawing conditions strongly affect both the α to β phase conversion degree and the crystalline morphology. Moreover the key role played by the crystalline relaxation of PVDF on the strain-induced structural evolution is also highlighted for the first time.

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