Supplementary Information: Evaluating the Recyclability and Restabilization of Laboratory Plastics Consumables: Impact of Autoclaving and Mechanical Recycling on Polypropylene

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1. Foreign polymer content

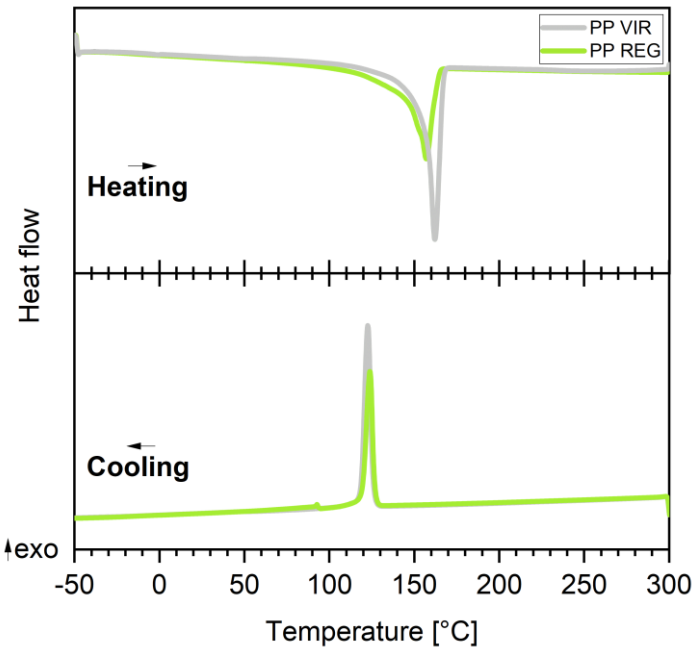

Figure S1: DSC heating and cooling curves of PP VIR and PP REG (second heating cycle). Only the melting of PP (PP VIR: T_m = 162 °C and PP REG: T_m = 157 °C in the heating curve) but no signs of other typical laboratory polymers such as polyethylene or polyethylene terephthalate can be seen.

2. Yield tensile strength in autoclaving studies

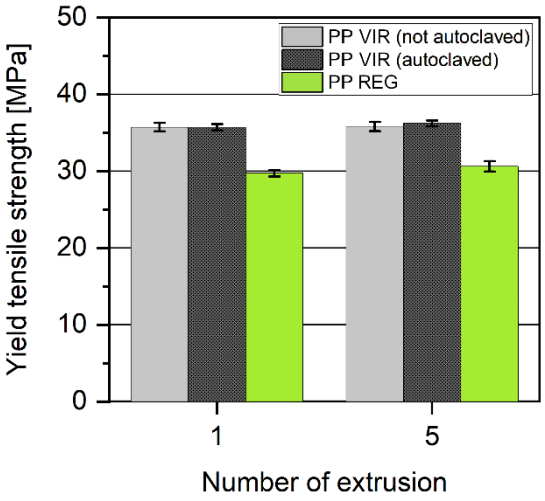

Figure S2: Yield tensile strength of PP grades in the as-received and autoclaved states. The values were obtained after the first and fifth extrusion cycles since tensile test specimens could not be produced directly from the regrind. Values are averages of 5 measurements ± standard deviation.

3. Elastic modulus in autoclaving studies

Table S1: Elastic modulus of PP grades in the as-received and autoclaved states. The values were obtained after the first and fifth extrusion cycle since tensile test specimens could not be produced directly from the regrind. Values are averages of 5 measurements ± standard deviation.

Sample	**Elastic modulus [MPa]**	
	1st	**5th**
PP VIR (not autoclaved)	1840 ± 50	1860 ± 60
PP VIR (autoclaved)	1840 ± 40	1890 ± 30
PP REG	1400 ± 20	1430 ± 20

4. Molecular weight distributions

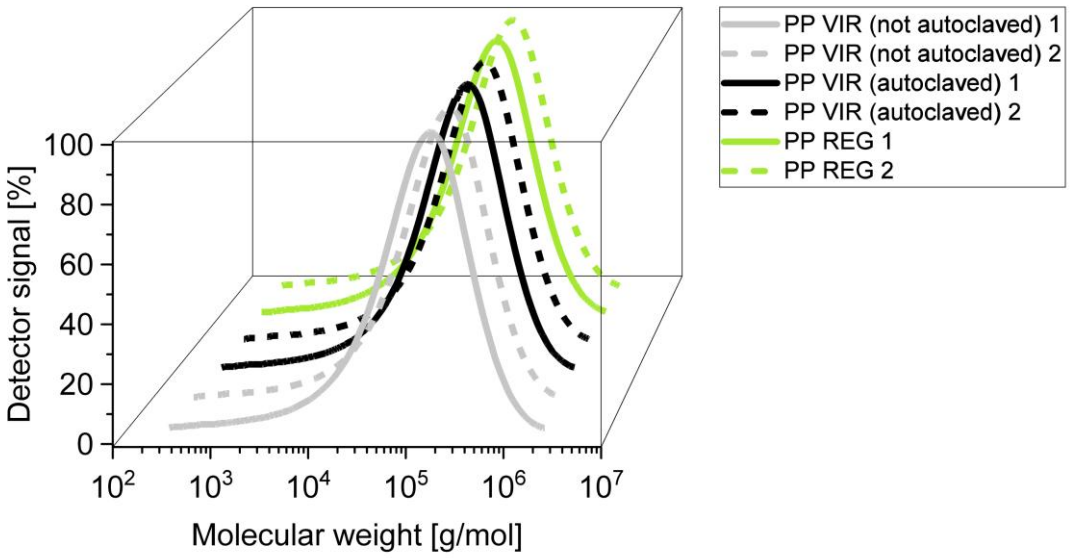

Figure S3: Molecular weight distributions of PP VIR and PP REG.

5. Yield tensile strength in restabilization series

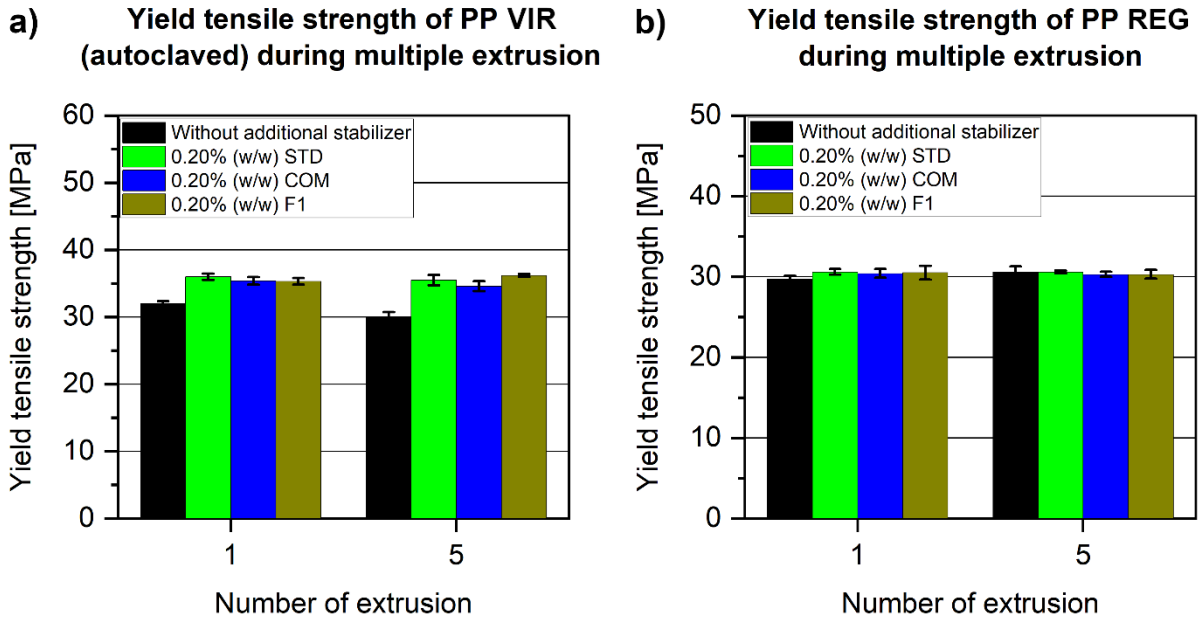

Figure S4: Effect of different stabilizer systems on the yield tensile strength of different PP grades after one and five extrusion cycles. Yield tensile strength of a) PP VIR (autoclaved) and of b) PP REG after first and fifth extrusion. Values are averages of 5 measurements ± standard deviation.

6. Color and gloss measurements

Table S2: *L** of PP VIR and PP REG after first and fifth extrusion. Values are averages of 9 measurements ± standard deviation. Samples were compounded with 0.20% (w/w) stabilizer.

Sample	Formulation	*L**	
		1st	5th
PP VIR (not autoclaved)	-	78.7 ± 0.3	76.8 ± 0.8
PP VIR (autoclaved)	-	78.3 ± 0.3	77.1 ± 0.4
	STD	78.7 ± 0.9	77.3 ± 0.4
	COM	78.4 ± 0.3	77.3 ± 0.4
	F1	76.9 ± 0.3	75.2 ± 0.4
PP REG	-	75.6 ± 0.4	75.5 ± 0.5
	STD	76.5 ± 0.9	73.9 ± 0.6
	COM	76.1 ± 0.5	75.4 ± 0.3
	F1	75.1 ± 0.3	74.5 ± 0.7

Table S3: *a** of PP VIR and PP REG after first and fifth extrusion. Values are averages of 9 measurements ± standard deviation. Samples were compounded with 0.20% (w/w) stabilizer.

Sample	Formulation	*a**	
		1st	5th
PP VIR (not autoclaved)	-	0.33 ± 0.09	0.47 ± 0.08
PP VIR (autoclaved)	-	0.24 ± 0.09	0.32 ± 0.02
	STD	0.14 ± 0.12	0.21 ± 0.09
	COM	0.27 ± 0.06	0.30 ± 0.14
	F1	0.23 ± 0.16	0.54 ± 0.14
PP REG	-	-0.53 ± 0.20	-0.91 ± 0.05
	STD	-0.58 ± 0.05	-0.92 ± 0.06
	COM	-0.31 ± 0.10	-0.58 ± 0.06
	F1	-0.45 ± 0.04	-0.52 ± 0.27

Table S4: *b** of PP VIR and PP REG after first and fifth extrusion. Values are averages of 9 measurements ± standard deviation. Samples were compounded with 0.20% (w/w) stabilizer.

Sample	Formulation	*b**	
		1st	5th
PP VIR (not autoclaved)	-	3.0 ± 0.1	6.7 ± 0.2
PP VIR (autoclaved)	-	3.0 ± 0.2	5.5 ± 0.2
	STD	2.1 ± 0.3	5.0 ± 0.3
	COM	2.8 ± 0.1	4.7 ± 0.3
	F1	7.2 ± 0.5	11.1 ± 0.8
PP REG	-	3.9 ± 0.1	5.9 ± 0.1
	STD	3.6 ± 0.5	9.0 ± 0.9
	COM	2.9 ± 0.3	4.8 ± 0.2
	F1	5.6 ± 0.1	8.0 ± 1.5

Table S5: *G* of PP VIR and PP REG after first and fifth extrusion. Values are averages of 9 measurements ± standard deviation. Samples were compounded with 0.20% (w/w) stabilizer.

Sample	**Formulation**	***G***	
		1st	**5th**
PP VIR (not autoclaved)	-	46.5 ± 1.7	46.4 ± 2.5
PP VIR (autoclaved)	-	47.3 ± 1.8	45.3 ± 2.6
	STD	39.1 ± 14.1	44.9 ± 2.7
	COM	46.5 ± 1.9	45.1 ± 1.7
	F1	41.5 ± 5.4	44.3 ± 3.6
PP REG	-	46.6 ± 1.7	52.9 ± 1.6
	STD	35.4 ± 10.9	50.9 ± 5.3
	COM	51.6 ± 5.0	49.6 ± 3.8
	F1	48.1 ± 3.8	50.4 ± 6.6

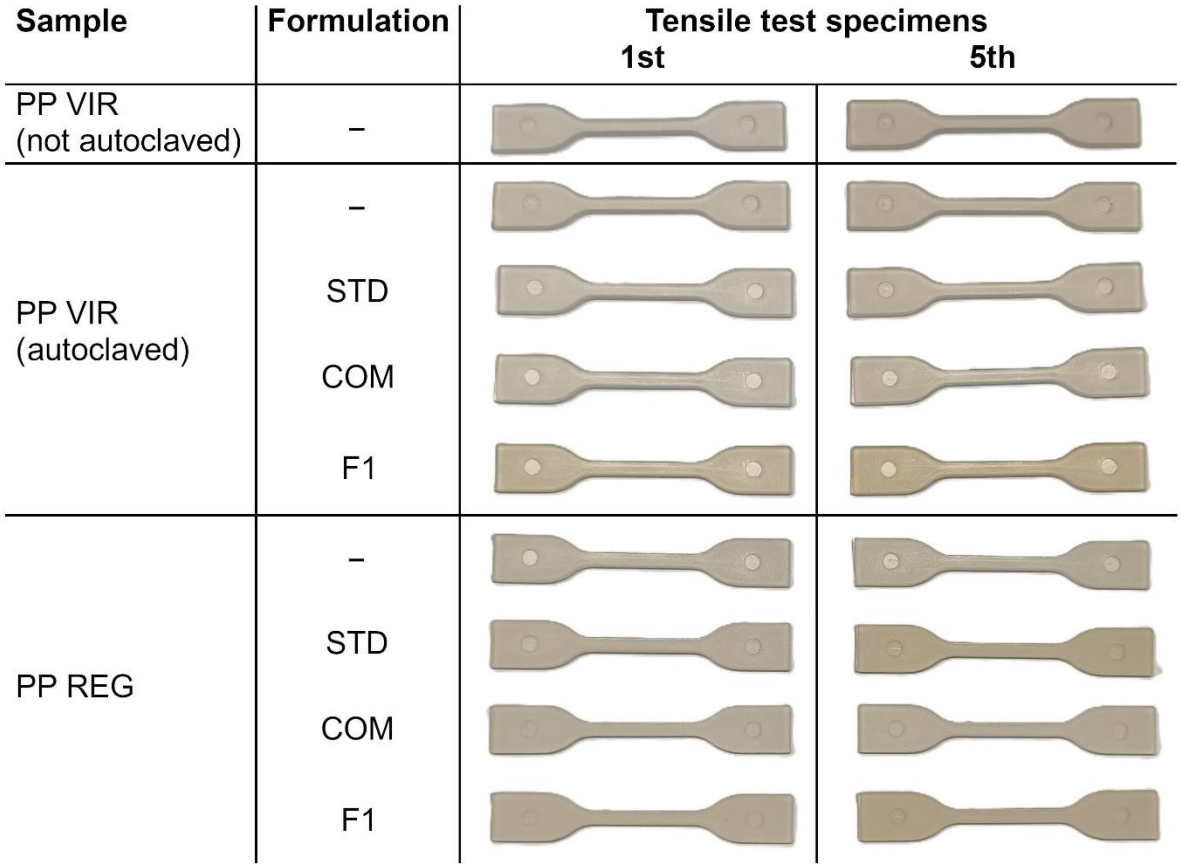

Figure S5: Photograph of the tensile test specimens of PP VIR and PP REG after first and fifth extrusion cycles with different stabilizer formulations.