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2019-07-23

Heat Set Creases in Polyethylene Terephthalate (PET) Sheets to Enable Origami-Based Applications

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Howell, Larry L.; Brown, Nathan C.; Sargent, Brandon S.; Jensen, Brian D.; Magleby, Spencer P.; and Pitt, William G., "Heat Set Creases in Polyethylene Terephthalate (PET) Sheets to Enable Origami-Based Applications" (2019). *ScholarsArchive Data*. 8.

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Data Set for “Heat Set Creases in Polyethylene Terephthalate (PET) Sheets to Enable Origami-Based Applications”

This data set includes the raw data from the tests described in the research paper “Heat Set Creases in Polyethylene Terephthalate (PET) Sheets to Enable Origami-Based Applications” by Brandon Sargent, Nathan Brown, Brian D. Jensen, Spencer P. Magleby, William G. Pitt, and Larry L. Howell.

Annealing Data

Folder Navigation:

Annealing data is found in the folder named “Annealing Data.” Each folder inside this folder is named as to signify the sample numbers it contains. Each folder contains the corresponding amount of raw data files labeled beginning counting from one. The first raw data file in the folder corresponds to the first sample number in the file name. For example, folder name “s301-308.is_tens_RawData” contains data for samples 301-308. Inside that folder contains files beginning with “Specimen_RawData_1” which corresponds to sample 301. “Specimen_RawData_2” would then correspond to sample 302, and so forth.

Sample Overview:

Below is an overview of the sample numbers used in each testing condition set.

Annealing Temperature (°C)	Anneal Time (min)	Cooling Rate	Sample Numbers
120	60	Drop	441-450, 996-1000
120	75	Drop	432-440, 991-995
120	90	Drop	421-430, 986-990
120	105	Drop	411-420, 981-985
120	120	Drop	401-410, 976-980
120	60	Slow Cool	491-500, 1021-1025
120	75	Slow Cool	481-490, 1026-1030
120	90	Slow Cool	471-480, 1031-1035
120	105	Slow Cool	461-470, 1036-1040
120	120	Slow Cool	451-460, 1041-1045
130	60	Drop	391-400, 951-955
130	75	Drop	381-390, 956-960
130	90	Drop	371-380, 961-965
130	105	Drop	361-370, 966-970
130	120	Drop	351-360, 971-975
130	60	Slow Cool	341-350
130	75	Slow Cool	331-340
130	90	Slow Cool	321-330

130	105	Slow Cool	311-320
130	120	Slow Cool	301-310
140	60	Drop	241-250, 941-949
140	75	Drop	231-240, 931-940
140	90	Drop	221-230, 921-930
140	105	Drop	211-220, 911-920
140	120	Drop	201-210, 901-910
140	60	Slow Cool	291-300
140	75	Slow Cool	281-290
140	90	Slow Cool	271-280
140	105	Slow Cool	261-270
140	120	Slow Cool	251-260
150	60	Drop	91-100, 737-745
150	75	Drop	81-90, 728-736
150	90	Drop	71-80, 719-727
150	105	Drop	61-70, 710-718
150	120	Drop	51-60, 701-709
150	60	Slow Cool	41-50, 831-840
150	75	Slow Cool	31-40, 841-850
150	90	Slow Cool	21-30, 851-860
150	105	Slow Cool	11-20, 861-870
150	120	Slow Cool	1-10, 871-880
160	60	Drop	191-200
160	75	Drop	181-190
160	90	Drop	171-180, 641-650
160	105	Drop	161-170, 661-680
160	120	Drop	151-160, 681-700
160	60	Slow Cool	141-150, 751-760
160	75	Slow Cool	131-140, 761-770
160	90	Slow Cool	121-130, 771-780
160	105	Slow Cool	111-120, 781-790
160	120	Slow Cool	101-110, 791-800
170	60	Drop	501-510
170	75	Drop	511-520
170	90	Drop	521-530
170	105	Drop	531-540
170	120	Drop	541-550
170	60	Slow Cool	551-560
170	75	Slow Cool	561-570
170	90	Slow Cool	571-580
170	105	Slow Cool	581-590

170	120	Slow Cool	591-600
180	60	Drop	601-605, 611-620
190	60	Drop	606-610, 651-660
200	60	Drop	881-895
200	60	Drop	621-635, 1017-1020
200	75	Drop	1013-1016
200	90	Drop	1009-1012
200	105	Drop	1005-1008
200	120	Drop	1001-1004
210	60	Drop	816-830
210	60	Drop	801-815
210	60	Drop	1046-1050
210	90	Drop	1051-1055

Optical Absorption Data

Sample Overview:

The spreadsheet file named “Sample Overview_Absorption.xlsx” reports the selected samples from each testing condition set and their corresponding optical absorption values.

Summary Files

The folder designated “Summary Files” contains the data in an easy to analyze format. These files were used for the statistics cited in the paper. Due to the straightforward reporting of data values, these files will most likely be the most helpful to researchers. Some samples were removed due to physical conditions that made the data for the test unusable. Note that statistical outliers have not been removed from these data sets.

Below are the names of the files followed by an explanation of its contents:

ForceMax_Complete

This reports the max force for every sample reported with the corresponding testing conditions: annealing temperature, anneal time and cooling rate (0 represents drop cool condition, 1 represents slow cool condition). This collection includes data from duplicate tests.

ForceMax_Refined

This reports the max force for every sample, reported with the corresponding testing conditions: annealing temperature, anneal time and cooling rate (0 represents drop cool condition, 1 represents slow cool condition). This file does not contain duplicate test data but includes data from last test of each testing condition.

ForceDrop_Complete

This reports the force drop observed in the stress relaxation tests, including data from duplicate tests. These values are reported with the corresponding testing conditions: annealing temperature, anneal time and cooling rate (0 represents drop cool condition, 1 represents slow cool condition).

ForceDrop_Refined

This reports the force drop observed in the stress relaxation tests. These values are reported with the corresponding testing conditions: annealing temperature, anneal time and cooling rate (0 represents drop cool condition, 1 represents slow cool condition). While "ForceDrop_Complete" includes data from duplicate tests, this file only contains data from the last test of each testing condition.

Absorption_Force

This file reports the absorption data from tested sample in two sections. The first section is a complete set of the testing data, including duplicate tests. The second section is a refined data set that includes the last samples tested from each testing condition.