



Health & Safety
Executive

**OFFSHORE TECHNOLOGY
REPORT - OTO 98 097**

**A Study of the Repeatability of
Explosion Tests
Preliminary Data Report for Test 1**

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Explosions in Full Scale Offshore Module Geometries

Health & Safety Executive Contract MaTSU 8847/3522

Preliminary Data Report for Test 1

Summary of Experimental Conditions	
Date	23rd June 1997
Time	15:59
Test Series	A
Confinement Configuration	C1
Obstacle Configuration	O1
Ignition Position	(X:13.5, Y:5, Z:0.4)
Mean Equivalence Ratio	1.12
Water Sprays	None

All data contained in this preliminary report is subject to final confirmation.

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Table 1: Flame Arrival Times

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-1	0.5	0.5	2.0	720.2
IP-2	6.0	0.5	2.0	696.3
IP-3	10.0	0.5	2.0	668.4
IP-4	14.0	0.5	2.0	667.3
IP-5	18.0	0.5	2.0	671.5
IP-6	22.0	0.5	2.0	706.2
IP-7	27.5	0.5	2.0	730.8
IP-8	0.5	4.0	2.0	723.1
IP-9	6.0	4.0	2.0	687.3
IP-10	14.0	4.0	2.0	379.7
IP-11	22.0	4.0	2.0	694.0
IP-12	27.5	4.0	2.0	725.6
IP-13	0.5	8.0	2.0	721.7
IP-14	6.0	8.0	2.0	692.8
IP-15	10.0	8.0	2.0	668.6
IP-16	14.0	8.0	2.0	593.7
IP-17	18.0	8.0	2.0	668.3
IP-18	22.0	8.0	2.0	705.9
IP-19	27.5	8.0	2.0	726.0
IP-20	0.5	11.5	2.0	724.8
IP-21	2.0	11.5	2.0	720.0
IP-22	6.0	11.5	2.0	711.9
IP-23	10.0	11.5	2.0	692.2
IP-24	14.0	11.5	2.0	678.7
IP-25	18.0	11.5	2.0	684.2
IP-26	22.0	11.5	2.0	702.8
IP-27	26.0	11.5	2.0	720.4
IP-28	27.5	11.5	2.0	725.5
IP-29	0.5	0.5	4.0	720.8
IP-30	6.0	0.5	4.0	695.9
IP-31	10.0	0.5	4.0	672.3
IP-32	14.0	0.5	4.0	645.8
IP-33	18.0	0.5	4.0	667.1

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-34	22.0	0.5	4.0	703.4
IP-35	26.0	0.5	4.0	719.8
IP-36	27.5	0.5	4.0	727.8
IP-37	0.5	4.0	4.0	718.7
IP-38	6.0	4.0	4.0	677.1
IP-39	14.0	4.0	4.0	577.0
IP-40	22.0	4.0	4.0	715.0
IP-41	26.0	4.0	4.0	724.8
IP-42	27.5	4.0	4.0	727.9
IP-43	0.5	8.0	4.0	717.9
IP-44	2.0	8.0	4.0	715.6
IP-45	6.0	8.0	4.0	692.3
IP-46	10.0	8.0	4.0	687.2
IP-47	14.0	8.0	4.0	616.1
IP-48	18.0	8.0	4.0	687.5
IP-49	22.0	8.0	4.0	710.8
IP-50	26.0	8.0	4.0	721.8
IP-51	27.5	8.0	4.0	725.7
IP-52	26.0	10.0	4.0	725.0
IP-53	27.5	10.0	4.0	725.8
IP-54	0.5	11.5	4.0	723.2
IP-55	2.0	11.5	4.0	721.1
IP-56	6.0	11.5	4.0	713.1
IP-57	10.0	11.5	4.0	690.9
IP-58	14.0	11.5	4.0	690.3
IP-59	18.0	11.5	4.0	704.9
IP-60	22.0	11.5	4.0	705.4
IP-61	26.0	11.5	4.0	722.7
IP-62	27.5	11.5	4.0	724.7
IP-63	0.5	0.5	6.0	723.8
IP-64	6.0	0.5	6.0	702.0
IP-65	10.0	0.5	6.0	689.1
IP-66	14.0	0.5	6.0	679.1
IP-67	18.0	0.5	6.0	696.0

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-68	22.0	0.5	6.0	710.5
IP-69	27.5	0.5	6.0	733.1
IP-70	0.5	4.0	6.0	723.6
IP-71	6.0	4.0	6.0	689.6
IP-72	14.0	4.0	6.3	674.1
IP-73	22.0	4.0	6.0	714.8
IP-74	27.5	4.0	6.0	733.3
IP-75	0.5	8.0	6.0	724.8
IP-76	6.0	8.0	6.0	713.0
IP-77	10.0	8.0	6.0	690.8
IP-78	14.0	8.0	6.0	674.5
IP-79	18.0	8.0	6.0	697.9
IP-80	22.0	8.0	6.0	715.7
IP-81	27.5	8.0	6.0	729.2
IP-82	0.5	11.5	6.0	725.2
IP-83	2.0	11.5	6.0	721.7
IP-84	6.0	11.5	6.0	717.4
IP-85	10.0	11.5	6.0	700.2
IP-86	14.0	11.5	6.0	686.7
IP-87	18.0	11.5	6.0	703.6
IP-88	22.0	11.5	6.0	715.3
IP-89	26.0	11.5	6.0	725.5
IP-90	27.5	11.5	6.0	729.3

Table 2: Internal Overpressures

Pressure Transducer	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Maximum Overpressure (mbar)	1.5ms Running Average			
					Maximum Overpressure (mbar)	Time of Arrival (ms)	Idealised Profile Representation	
							Rise Time (ms)	Duration (ms)
PI-1	0.8	0.5	0.0	1079	831	731.6	32.1	58.0
PI-2	6.0	0.5	0.0	616	576	732.8	63.5	87.4
PI-3	12.5	0.5	0.0	658	636	742.6	102.3	118.4
PI-4	22.0	0.5	0.0	791	724	737.5	50.0	72.8
PI-5	27.5	0.5	0.0	1383	1132	733.2	28.4	42.3
PI-6	0.5	6.0	0.0	1791	1521	730.8	23.5	29.9
PI-7	9.0	6.0	0.0	691	632	736.2	92.6	111.6
PI-8	14.0	6.0	0.0	817	722	740.3	90.0	106.9
PI-9	21.0	6.0	0.0	895	752	735.0	68.4	89.3
PI-10	27.5	6.0	0.0	1496	1061	732.7	35.3	54.6
PI-11	0.5	11.5	0.0	1559	1469	725.0	17.7	34.1
PI-12	12.3	11.5	0.0	652	596	732.4	75.7	101.8
PI-13	27.5	11.5	0.0	2519	1772	726.3	17.6	38.2
PI-14	0.5	0.5	4.0	817	731	729.8	32.7	61.9
PI-15	4.5	0.6	4.0	659	585	735.5	72.6	98.6
PI-16	11.2	0.0	5.5	705	673	740.1	95.6	114.4
PI-17	12.0	0.5	4.0	571	539	738.6	106.8	124.6
PI-18	22.0	0.5	4.0	853	772	733.6	48.1	72.6
PI-19	27.5	0.5	4.0	1725	1128	730.1	20.1	40.2
PI-20	10.2	4.0	4.0	789	710	740.3	92.8	110.1
PI-21	0.5	7.0	4.0	1111	1023	727.9	27.7	44.1
PI-22	18.0	8.0	4.0	784	721	740.7	79.3	94.2
PI-23	27.5	6.0	4.0	1913	1574	726.6	14.9	-
PI-24	0.5	11.5	4.0	1347	1032	723.1	17.2	45.3
PI-25	10.0	11.5	4.0	571	494	738.1	78.8	102.1
PI-26	18.0	11.5	4.0	591	567	729.5	63.6	90.3
PI-27	27.5	11.5	4.0	2229	1599	726.5	15.1	38.2
PI-28	0.8	0.8	8.0	1831	1005	734.4	31.2	41.0
PI-29	13.9	1.7	8.0	803	663	735.0	75.4	96.3
PI-30	26.1	1.7	8.0	2953	1889	737.9	2.0	7.3
PI-31	5.9	5.0	8.0	986	835	733.7	54.8	69.6
PI-32	18.9	5.0	8.0	1143	875	731.7	58.4	82.4
PI-33	1.1	11.1	8.0	1182	1087	728.0	22.0	31.0
PI-34	12.8	11.2	8.0	827	702	734.9	65.1	88.4
PI-35	26.1	11.3	8.0	2555	1748	732.3	21.0	427.0

Table 3 : External Overpressures

Pressure Transducer	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Maximum Overpressure (mbar)	Maximum Overpressure 1.5ms Running Average (mbar)
PE-1	34.0	6.0	1.0	-	-
PE-2	40.0	6.0	1.0	1180	862
PE-3	52.0	6.0	1.0	894	651
PE-4	76.0	6.0	1.0	315	217
PE-5	47.2	25.2	1.0	1320	805
PE-6	61.3	39.3	1.0	271	244
PE-7	14.0	18.0	1.0	-	-
PE-8	14.0	24.0	1.0	-	-
PE-9	14.0	36.0	1.0	470	405
PE-10	14.0	60.0	1.0	240	221
PE-11	-21.2	25.2	1.0	419	347

Table 4: Gas Concentrations

Measuring Position	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Natural Gas Concentration (%)
1	25.7	4.0	0.7	9.8
2	12.0	8.0	0.8	9.8
3	1.2	3.1	1.5	9.7
4	7.7	10.9	3.8	9.9
5	13.5	5.5	4.5	10.0
6	25.9	6.0	5.2	9.9
7	4.0	8.5	4.9	9.9
8	19.8	8.0	7.6	10.0

Table 5: Weather Conditions

Air Temperature (°C)	Atmospheric Pressure (mbar)	Wind Speed (ms⁻¹)	Wind Direction (° from Magnetic North)
15	973	2.4	355

Table 6: Confinement Configuration

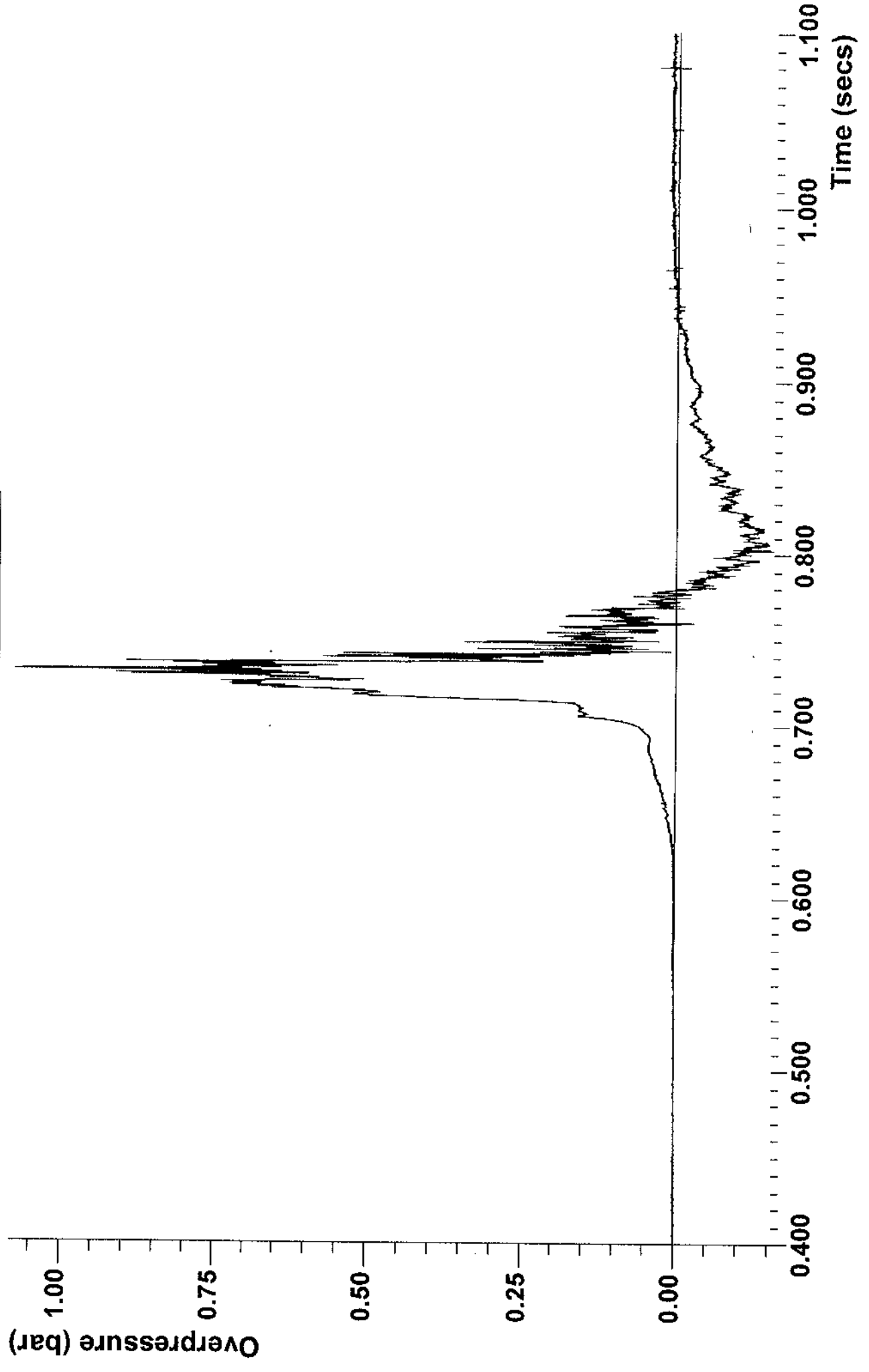
Confinement Configuration	Rig Face*	Confinement
C1	North	Open
	East	Open
	South	Open
	West	Open

* - Origin is at the junction of the West and South faces at ground level. Roof and floor also confined.

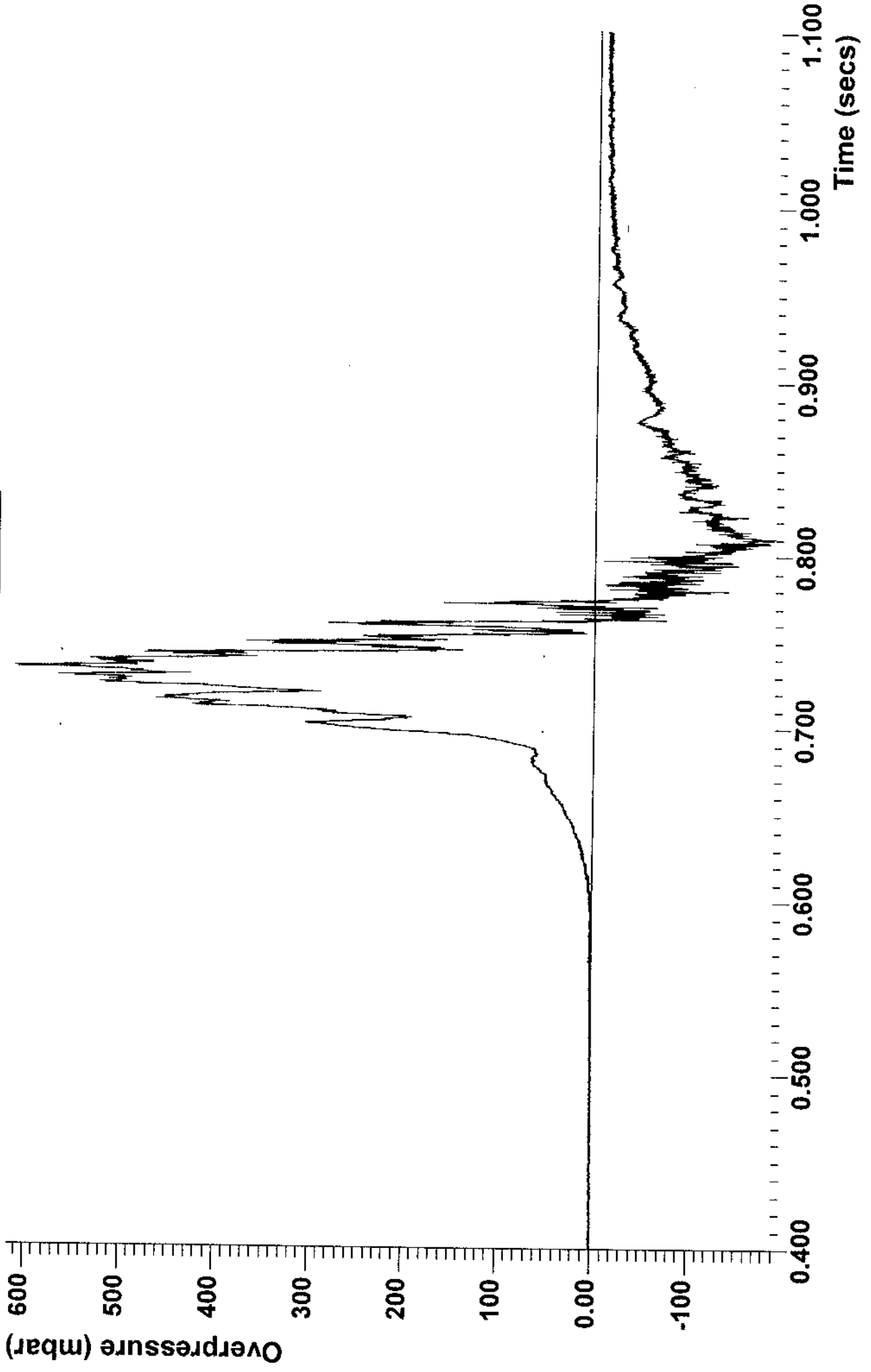
Appendix A: Internal Overpressure Profiles

Appendix B: External Overpressure Profiles

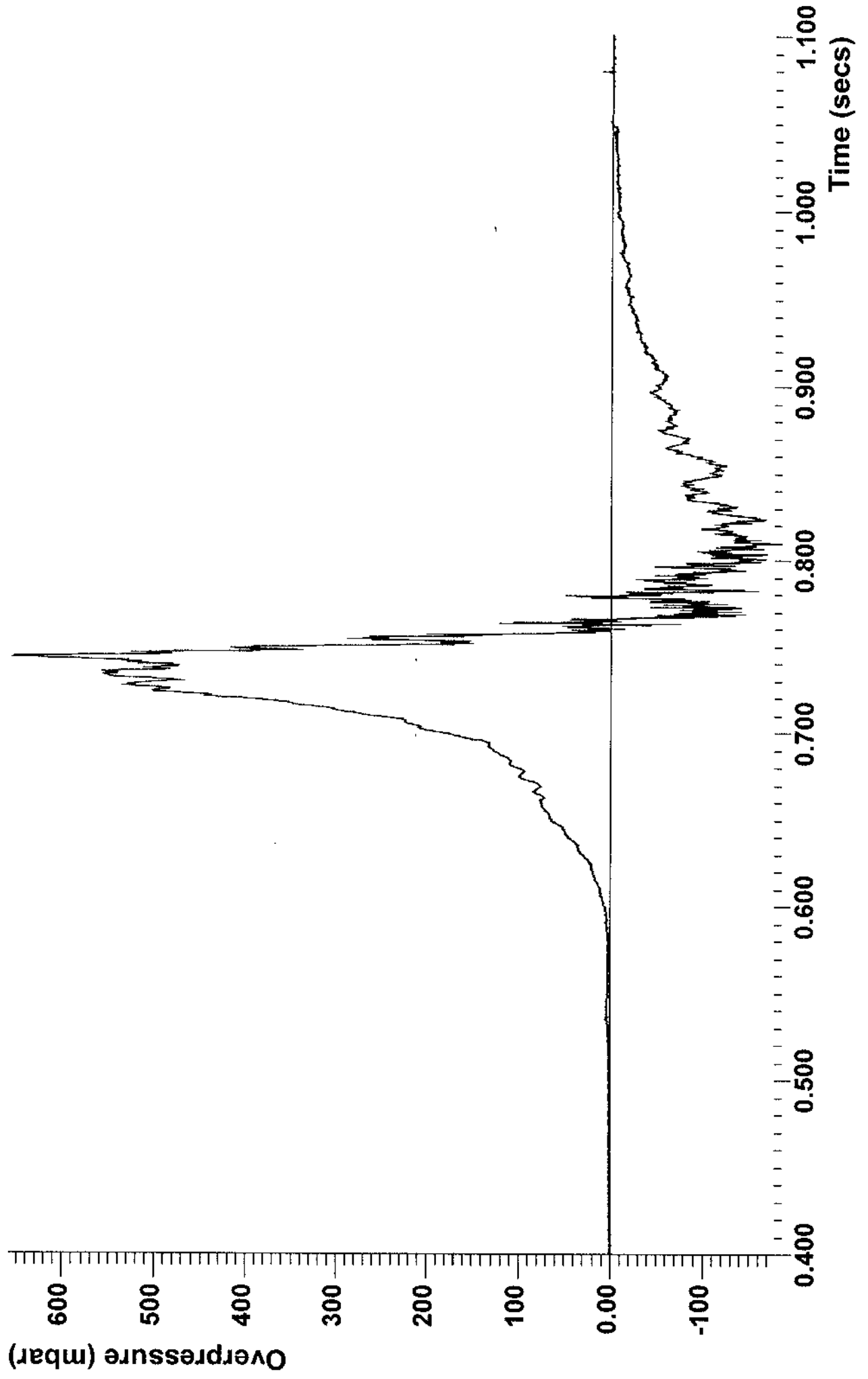
Test: HSE 1 (O1, C1, I1)
Transducer no: PI-1



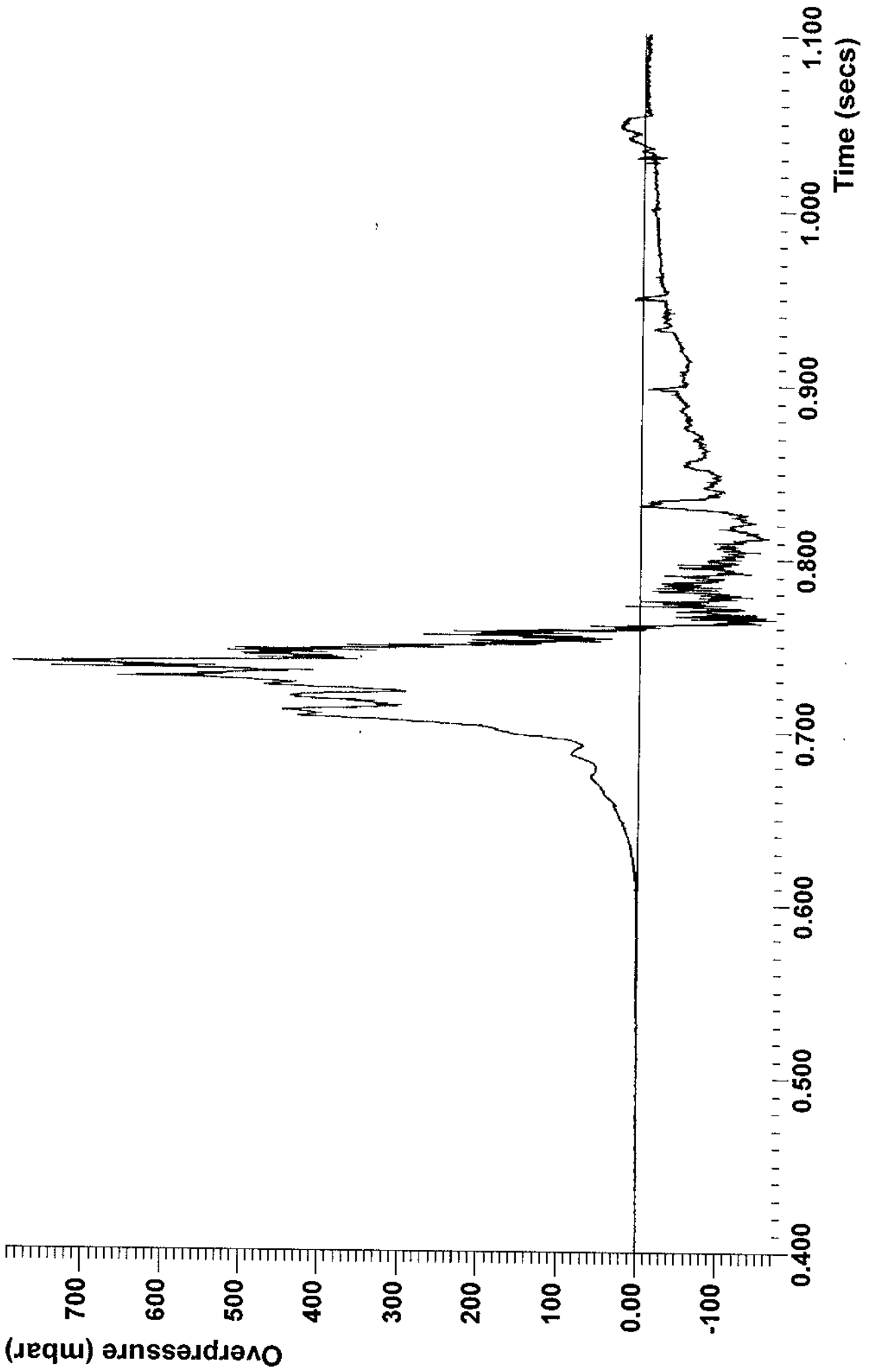
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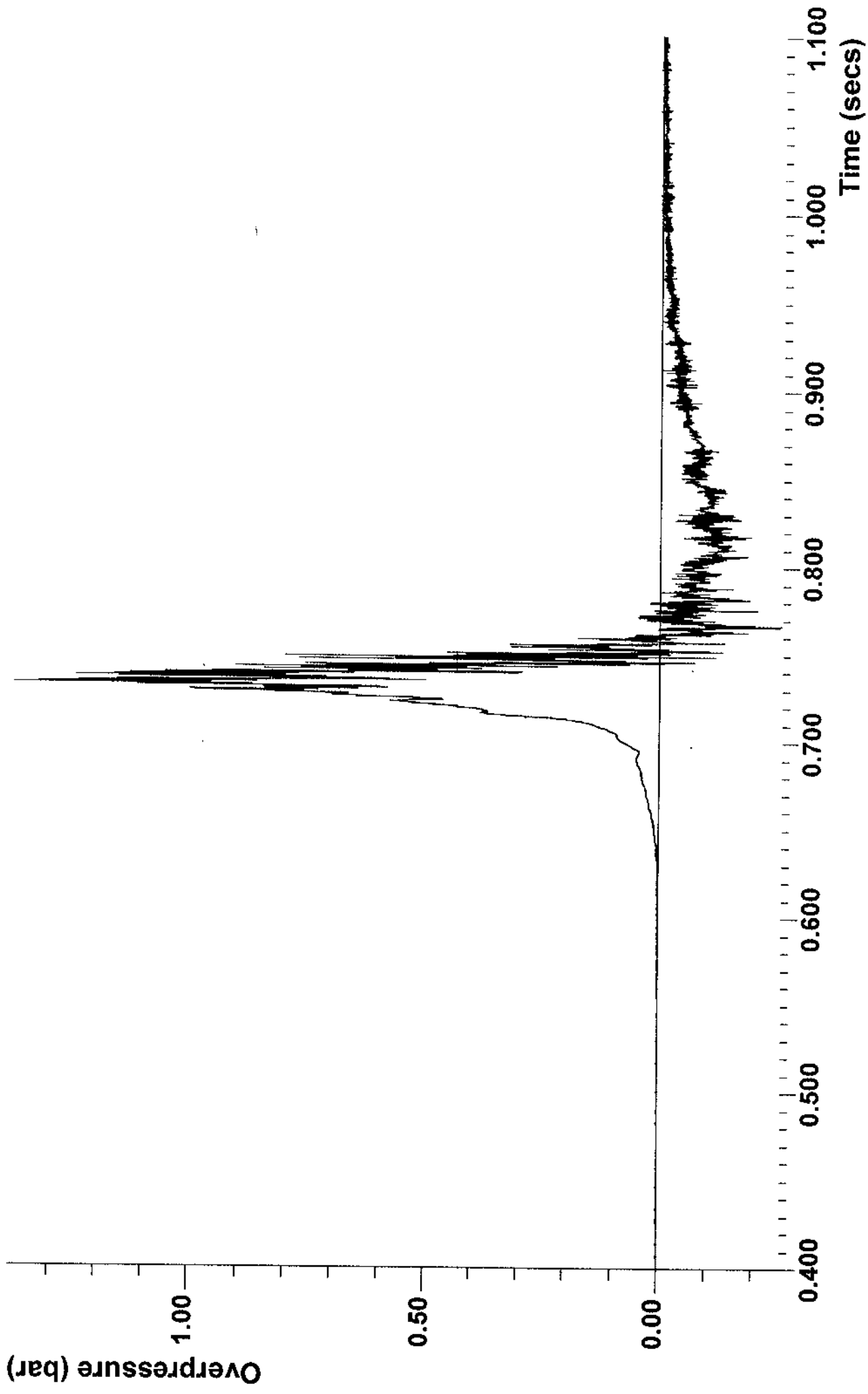
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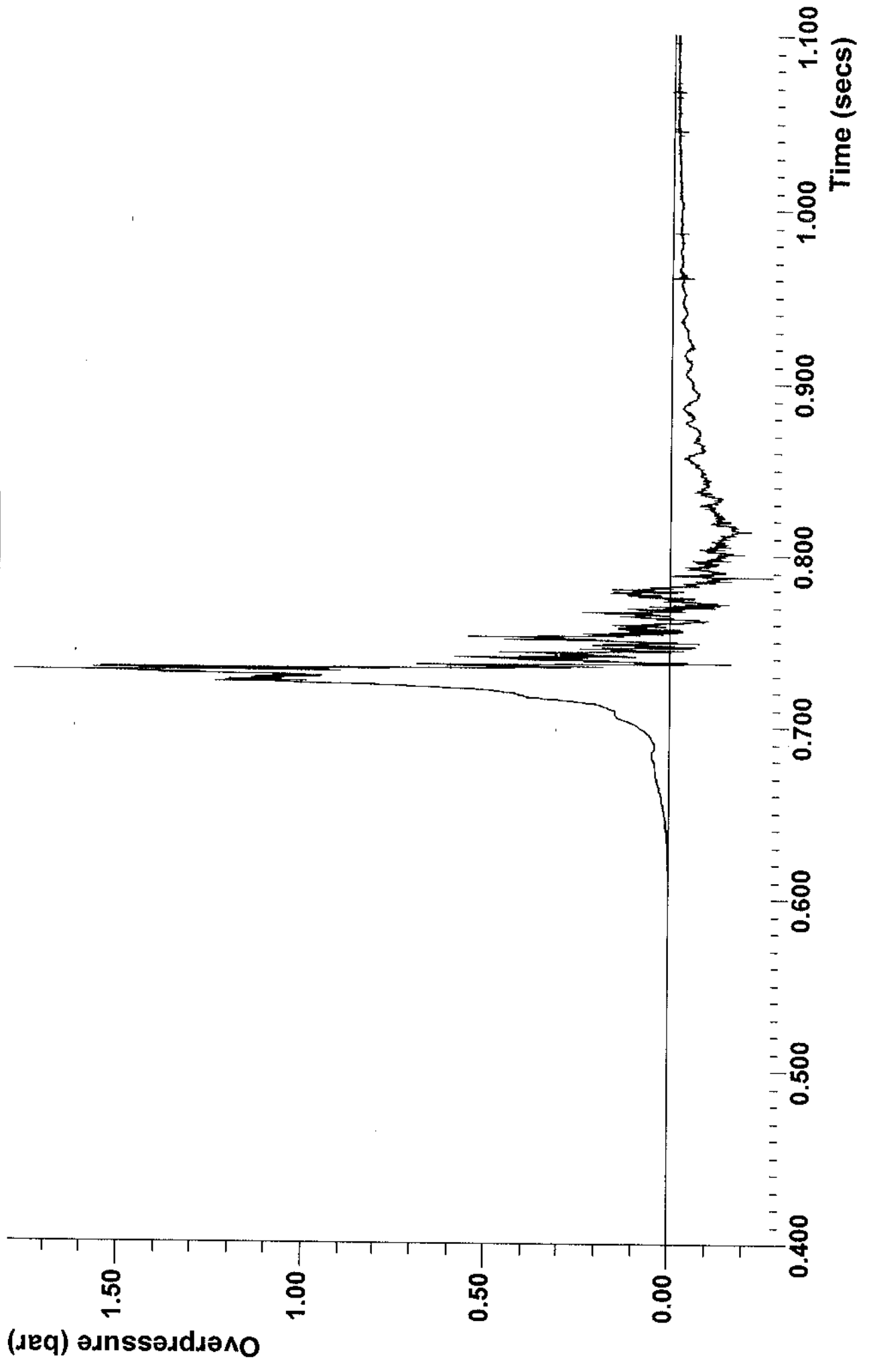
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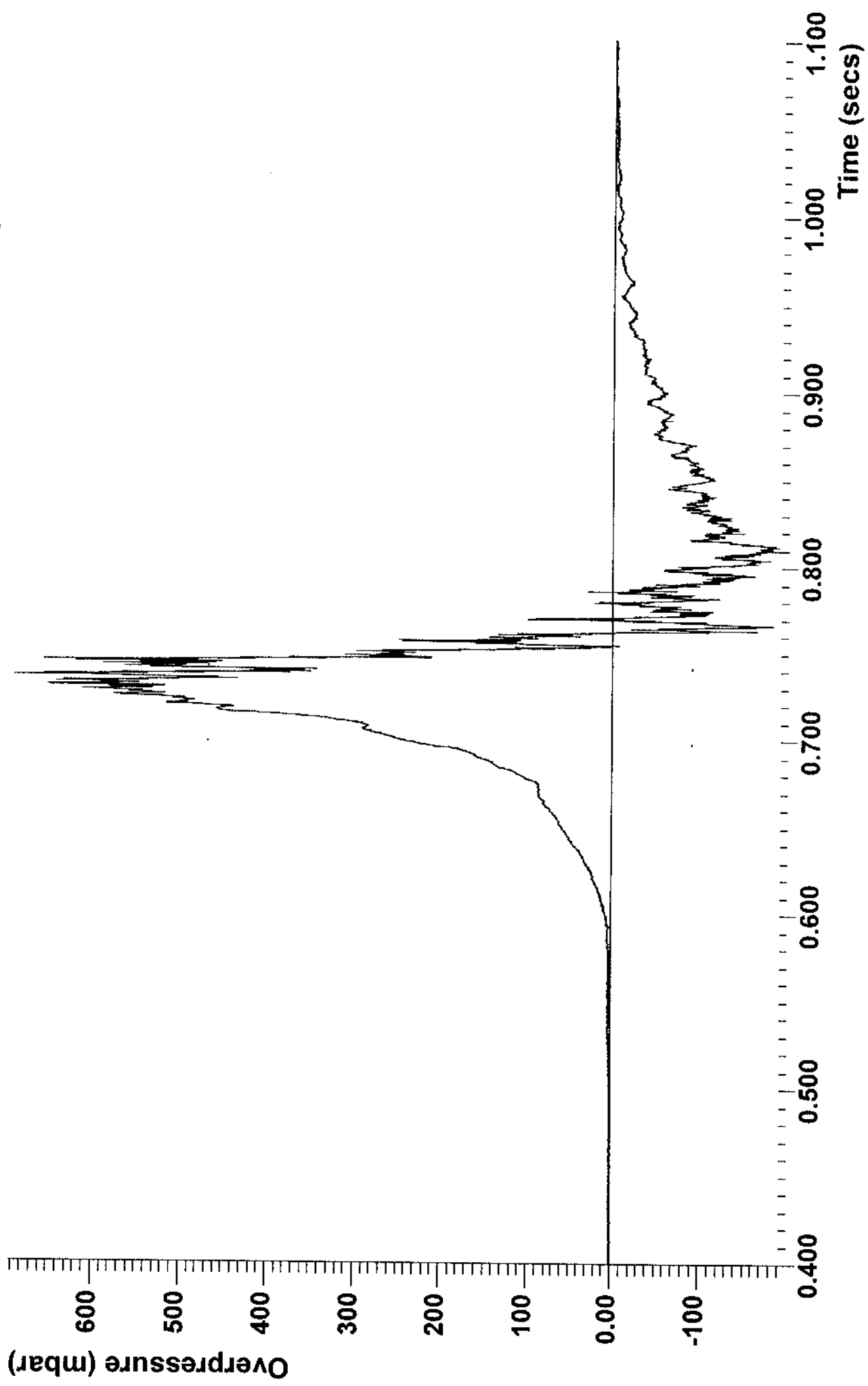
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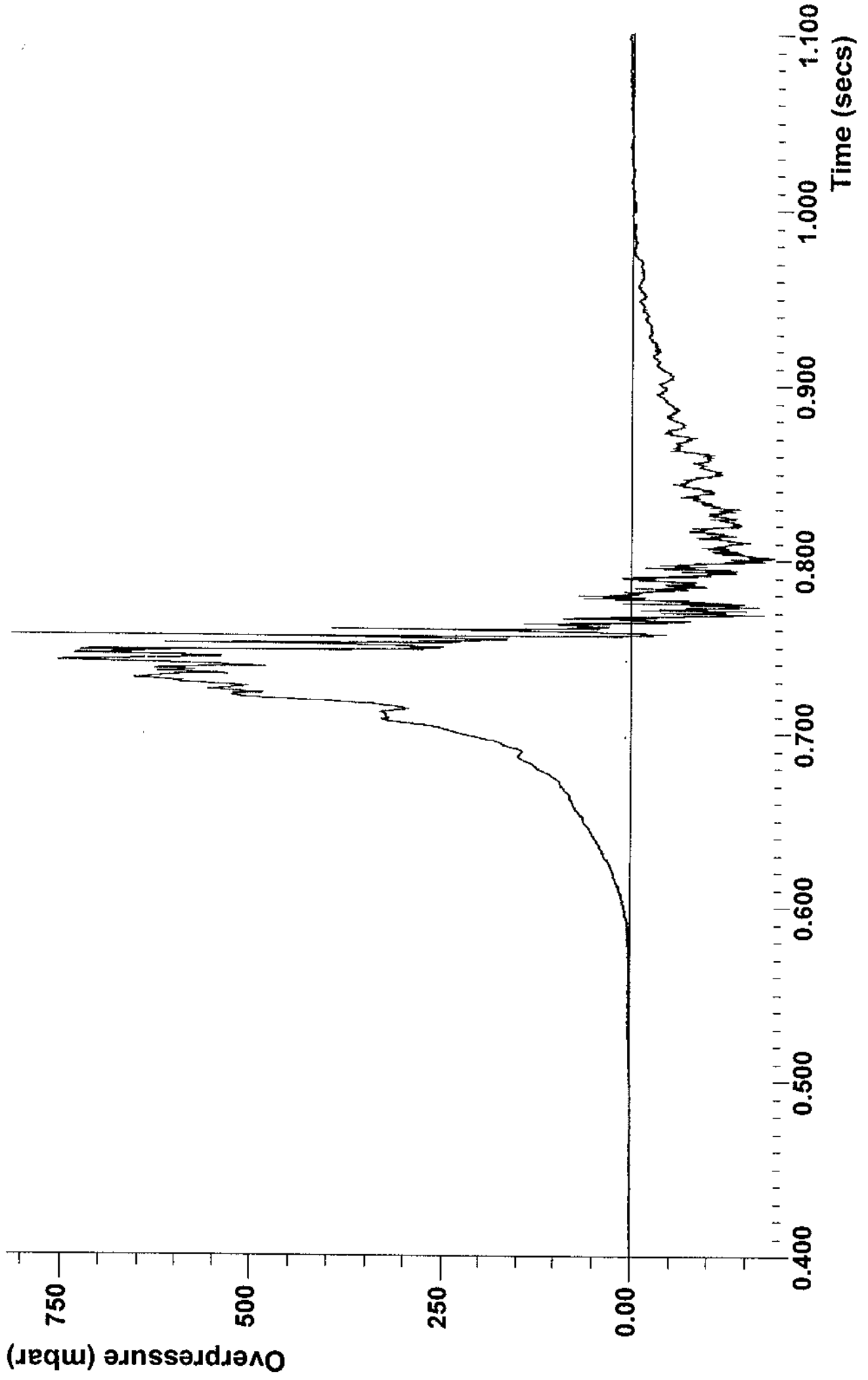
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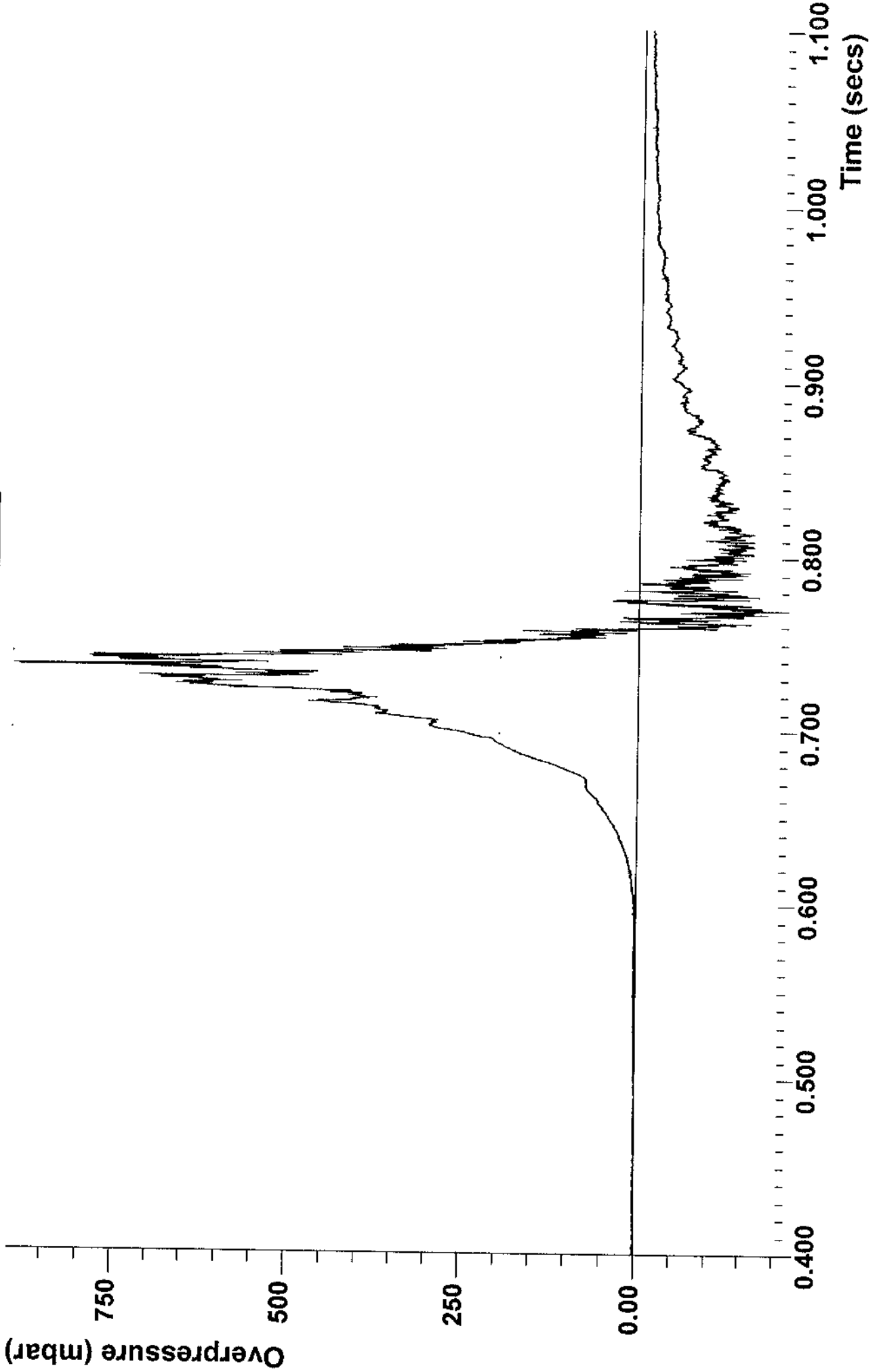
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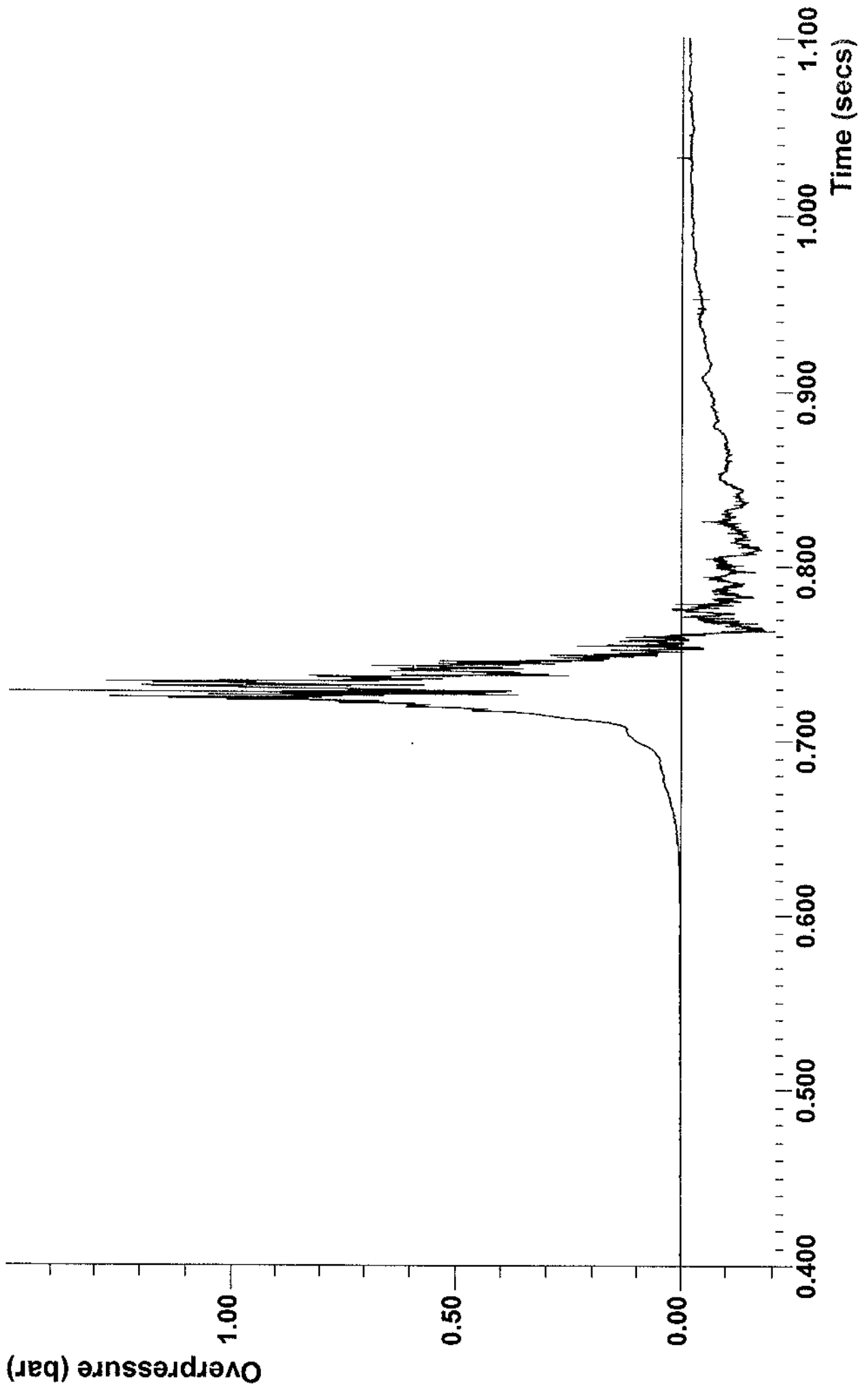
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Transducer no: PI-8



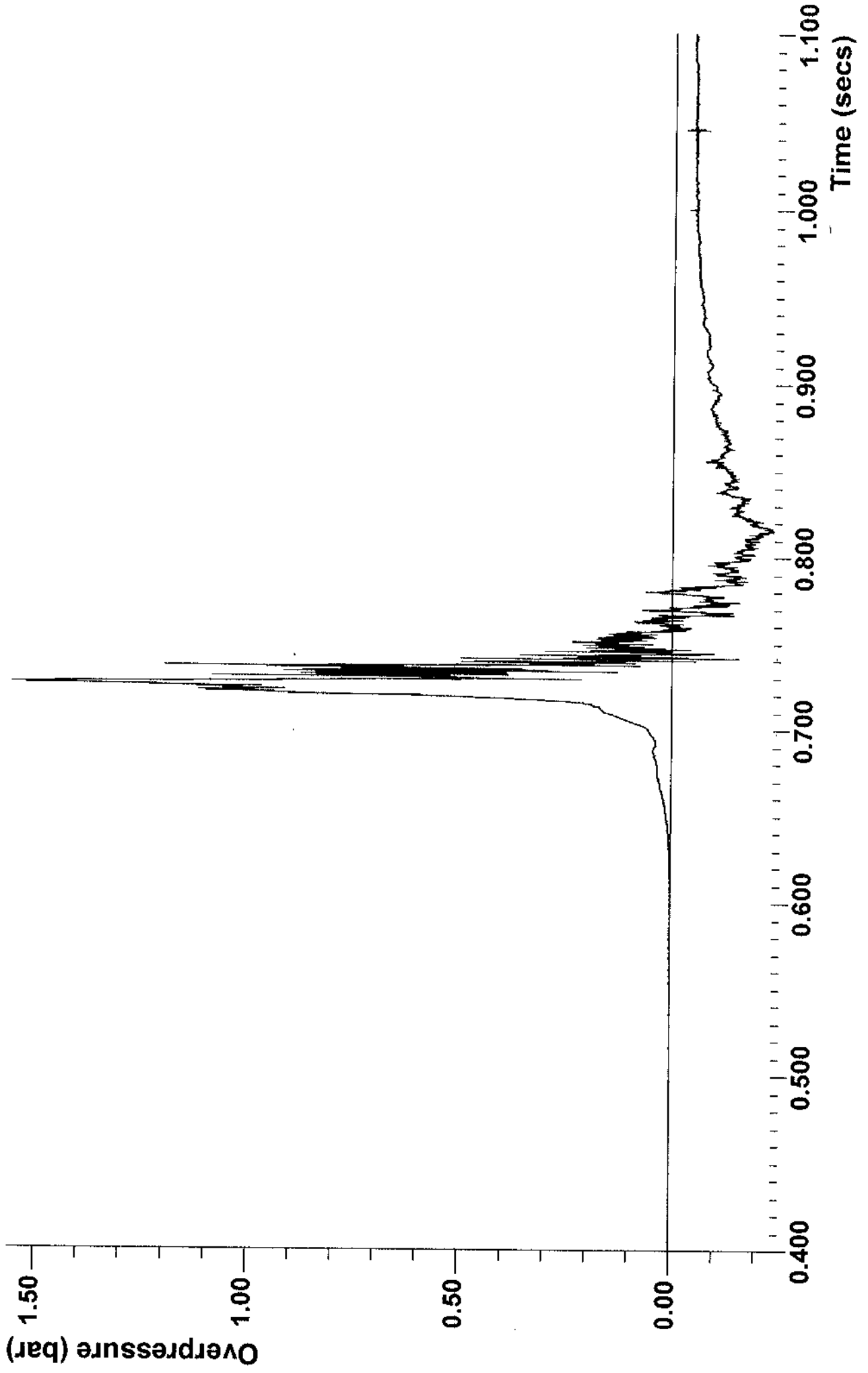
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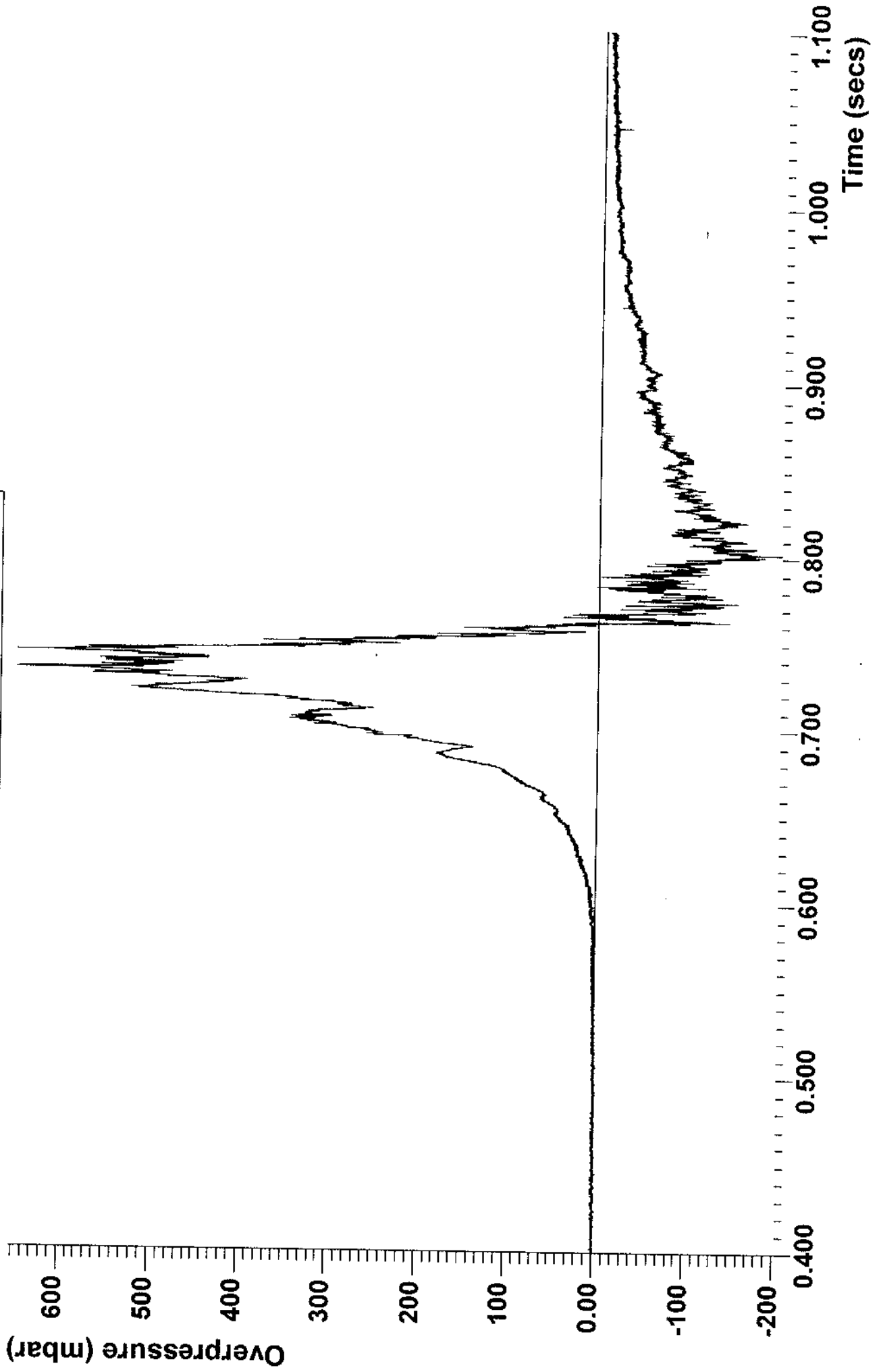
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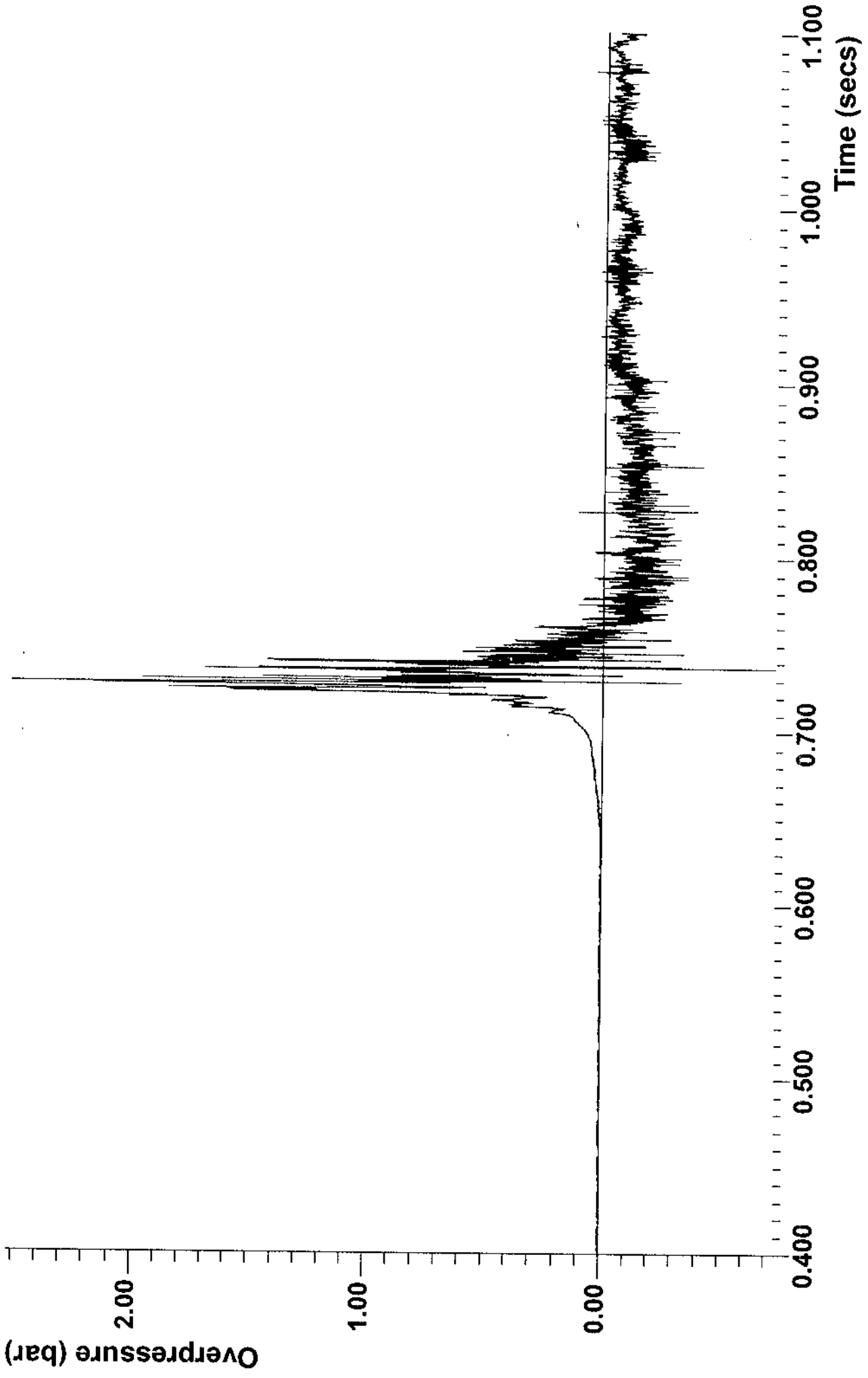
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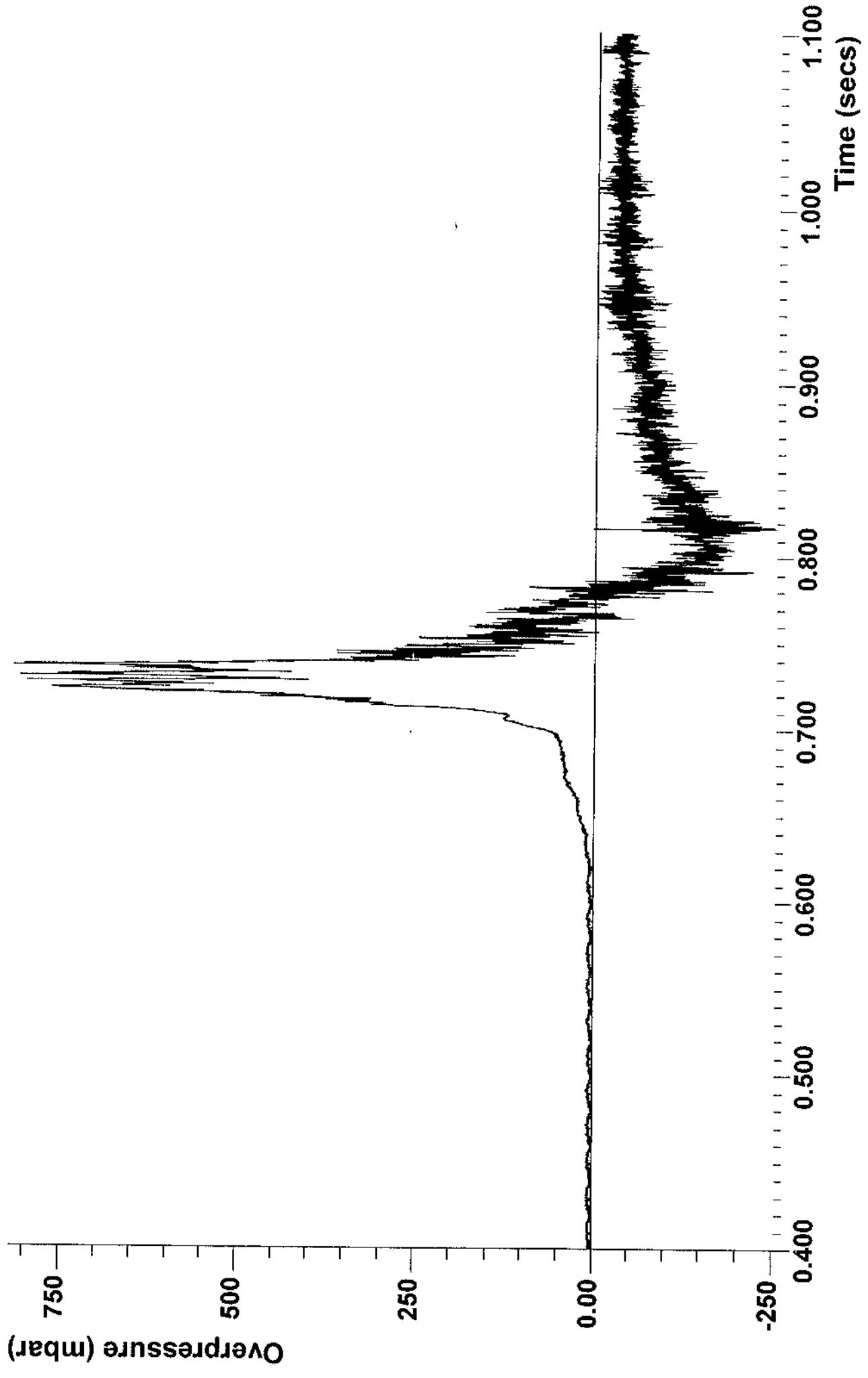
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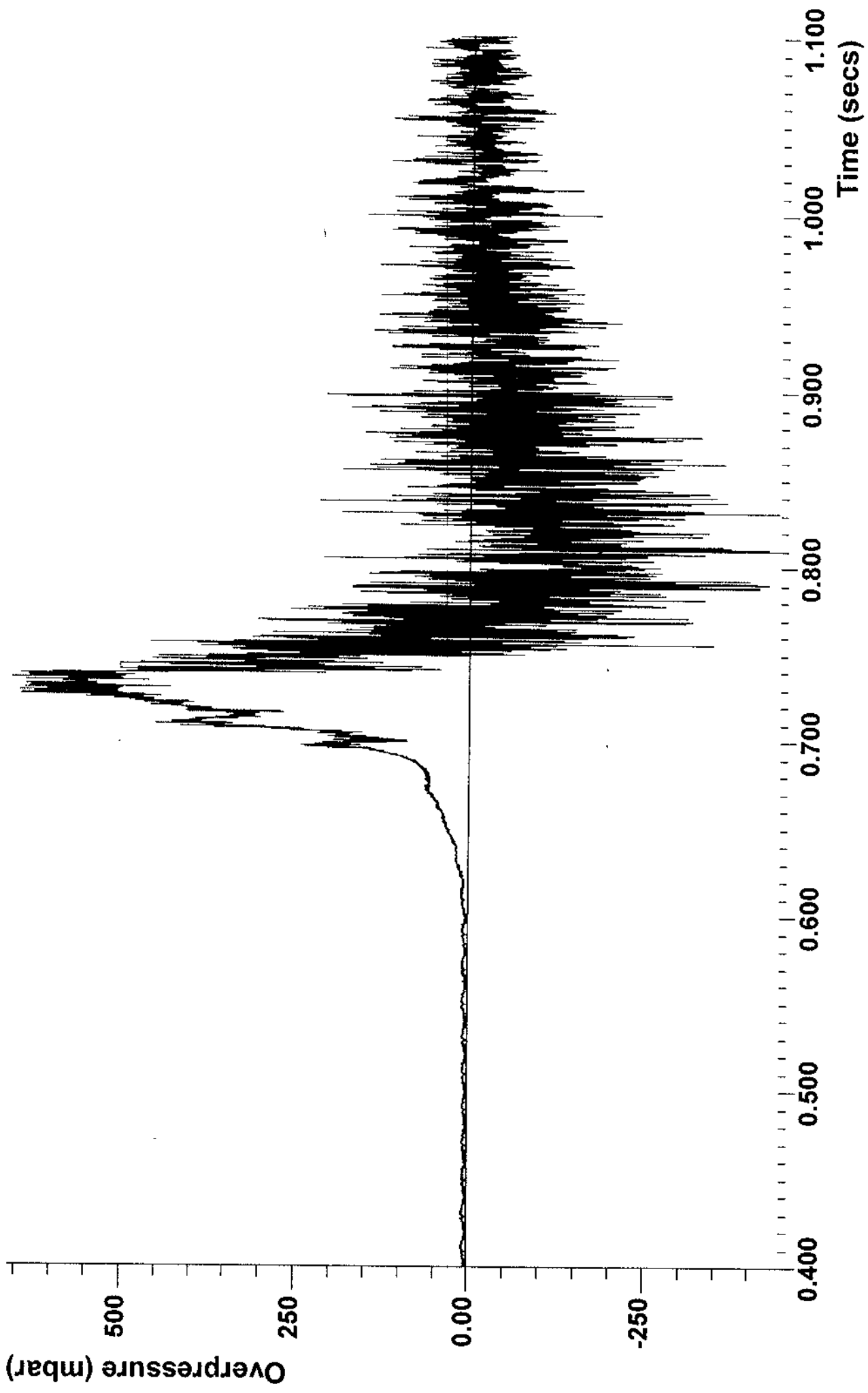
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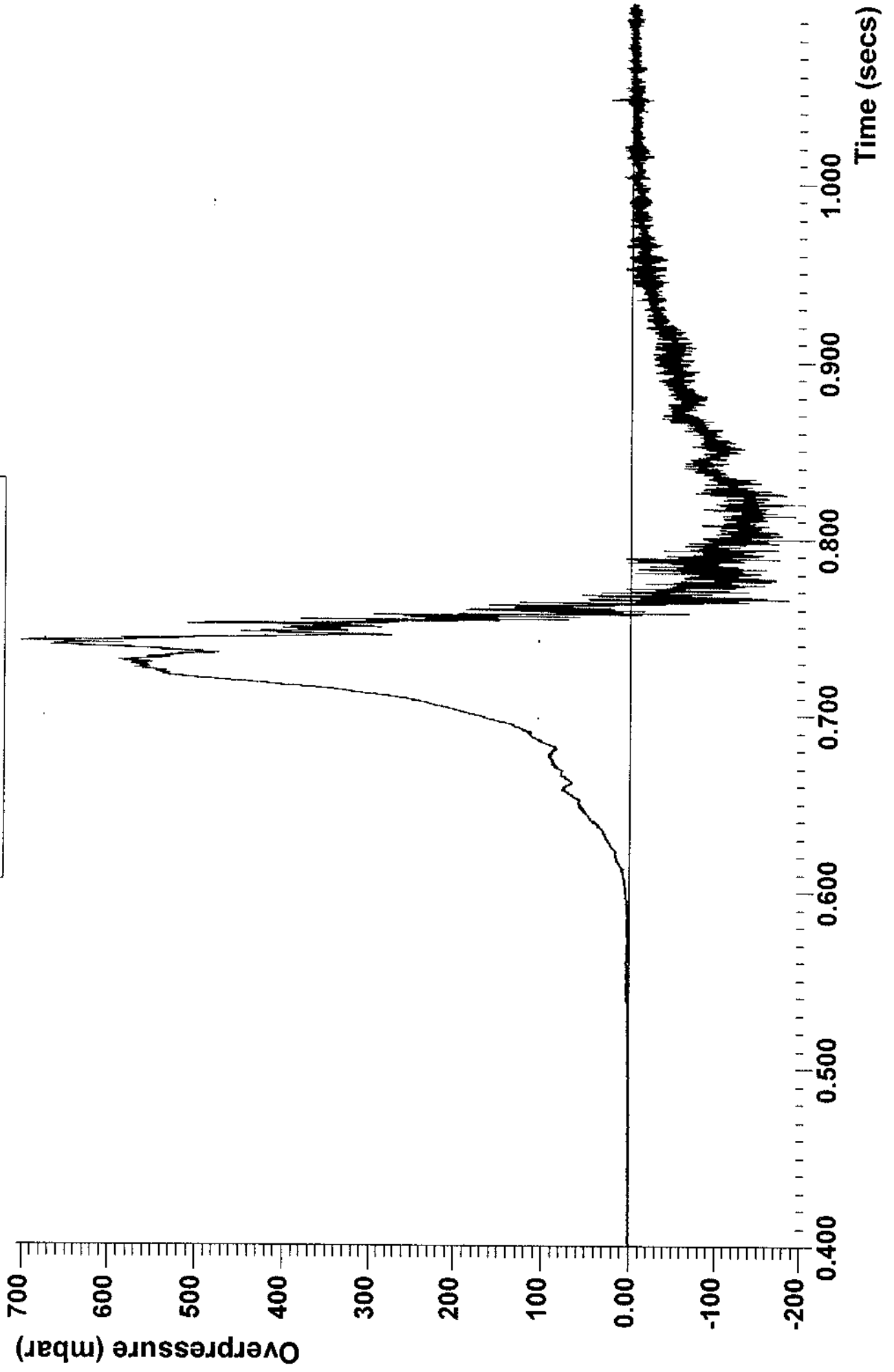
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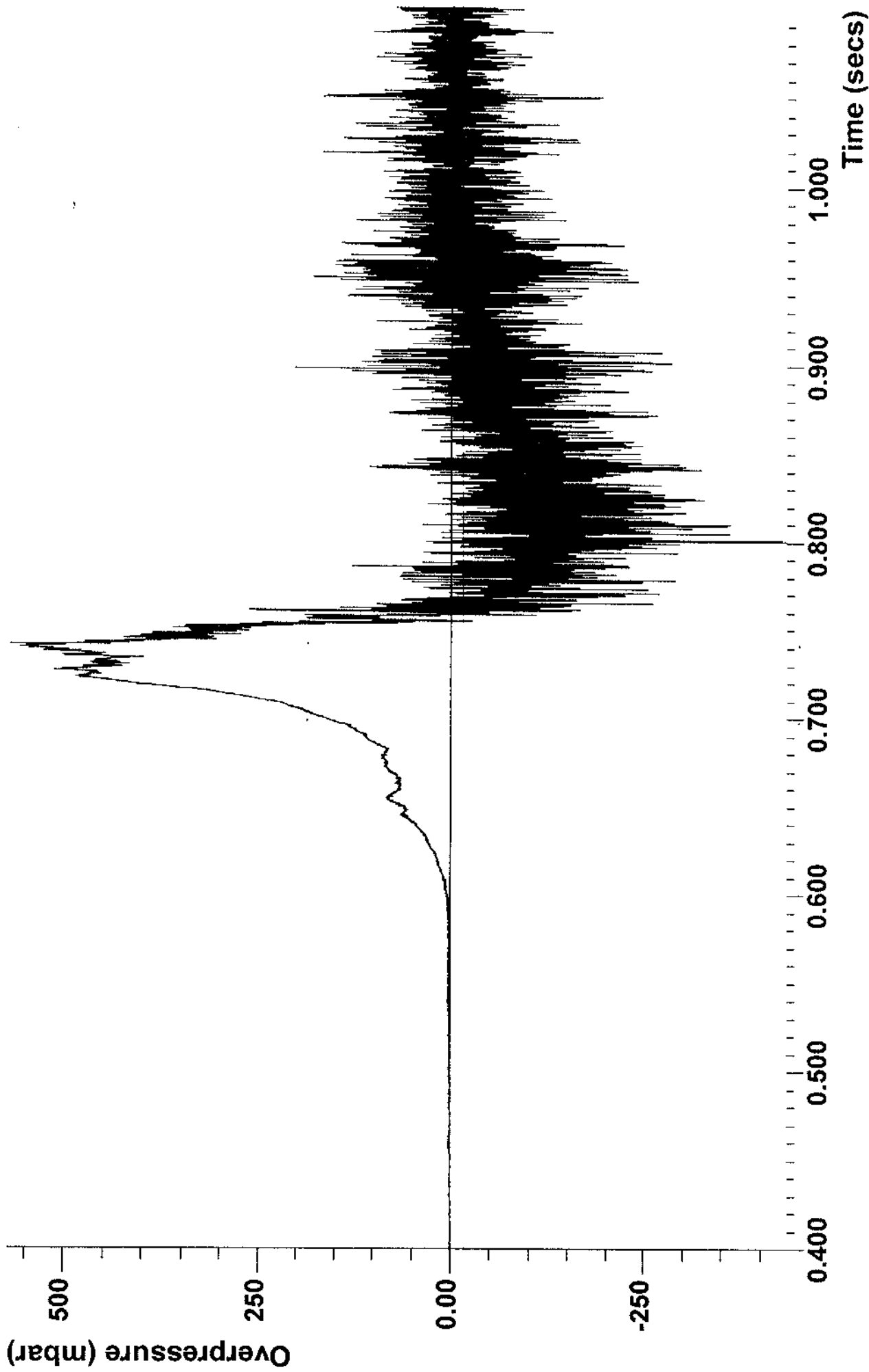
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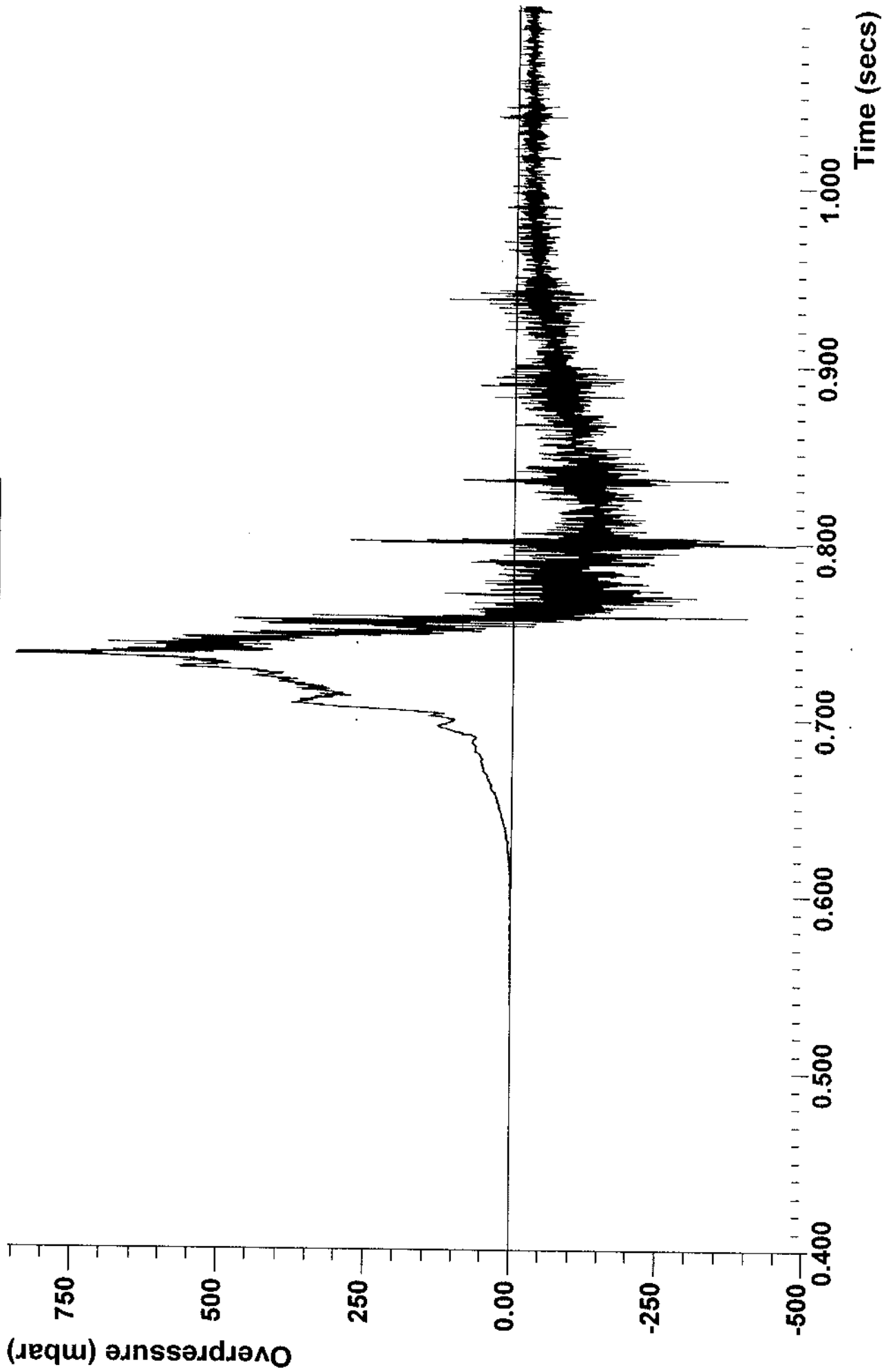
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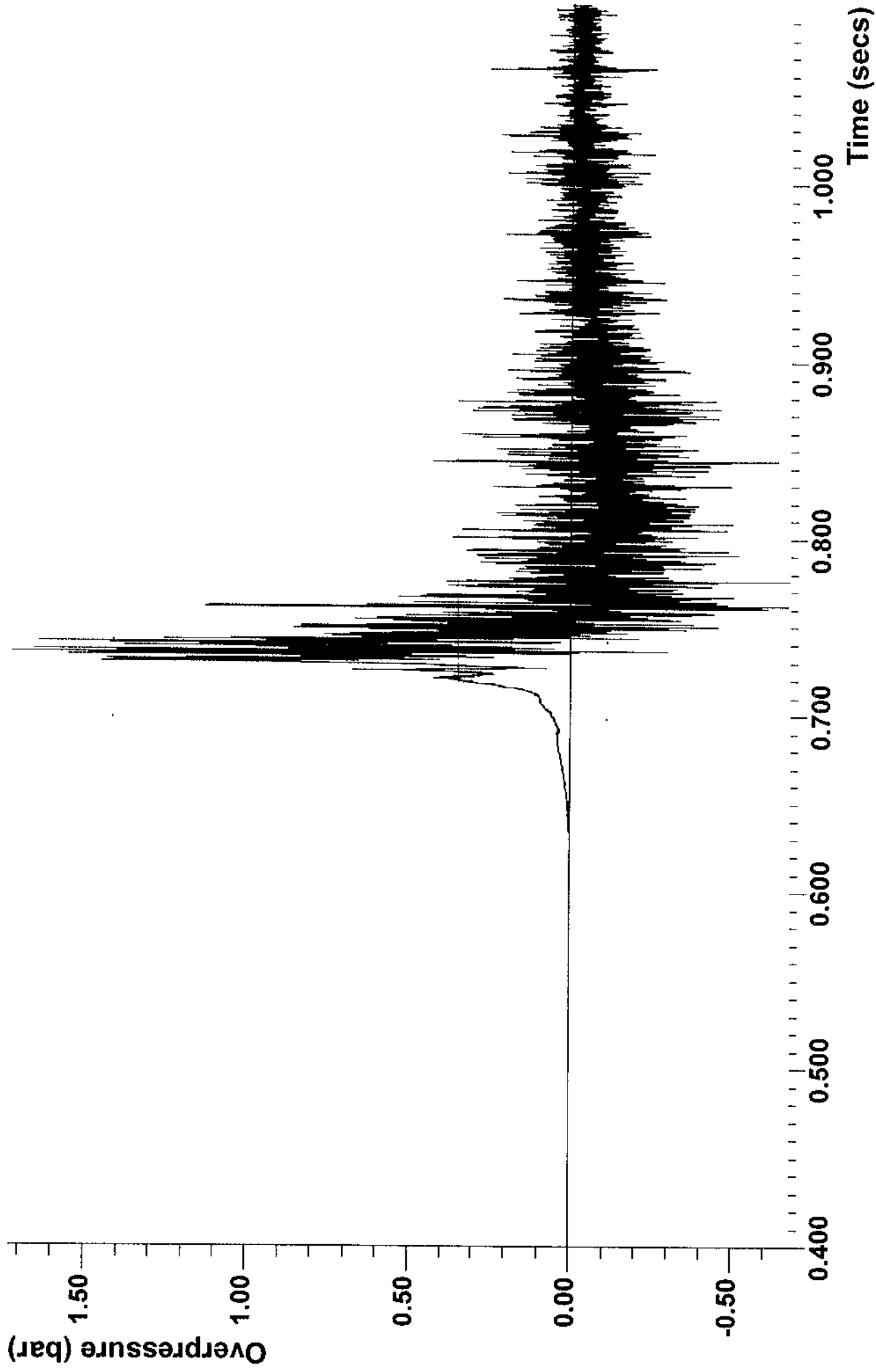
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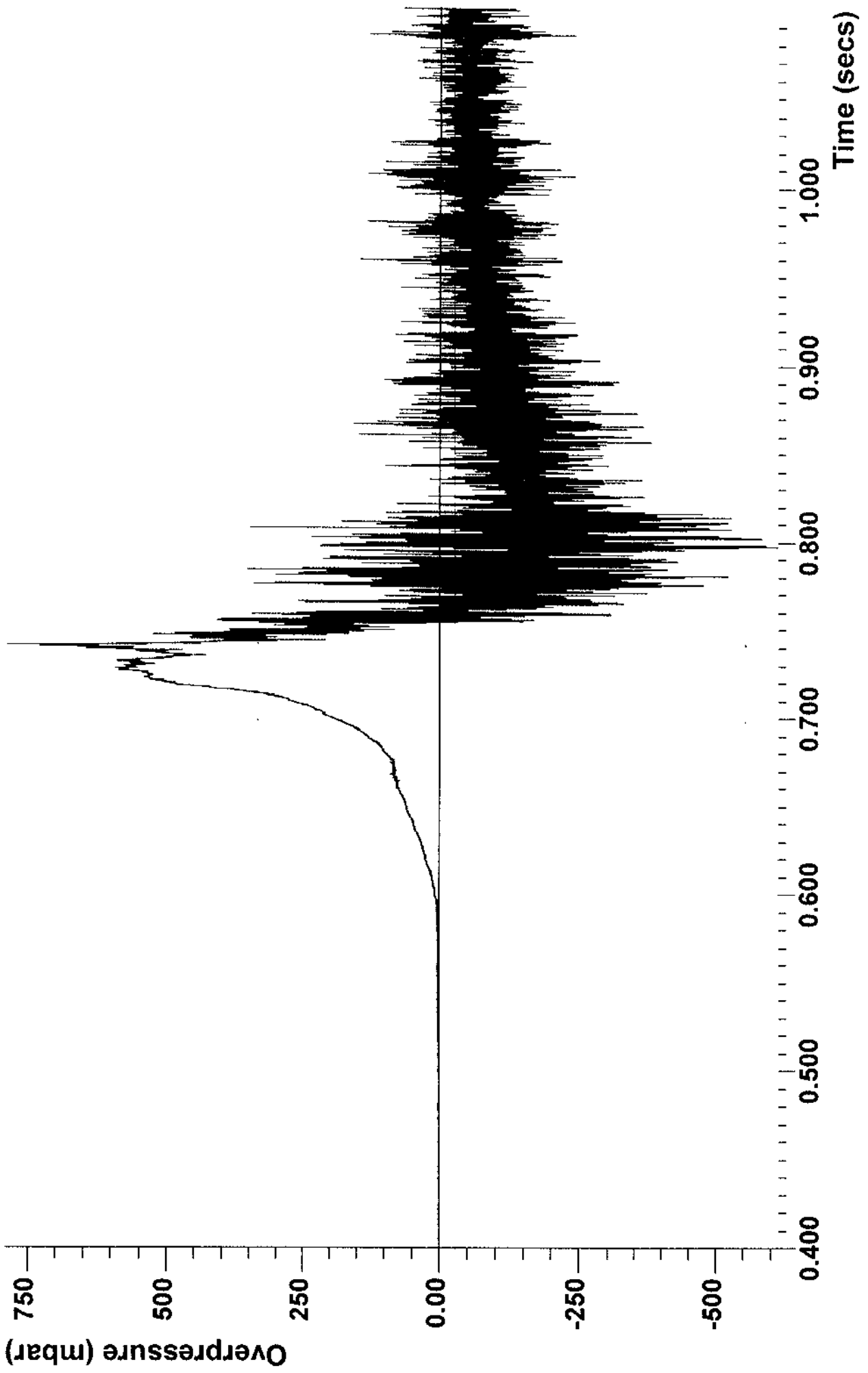
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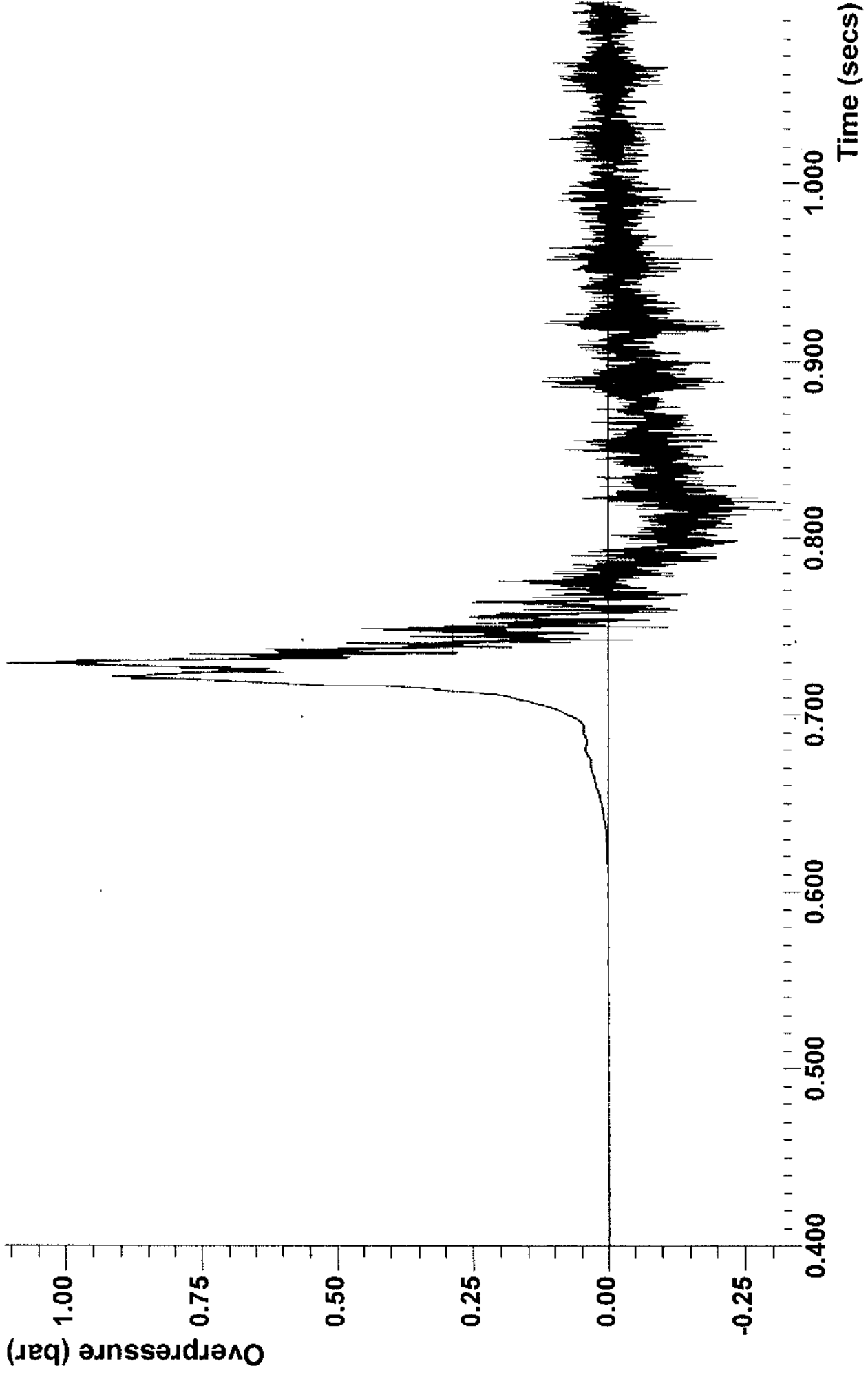
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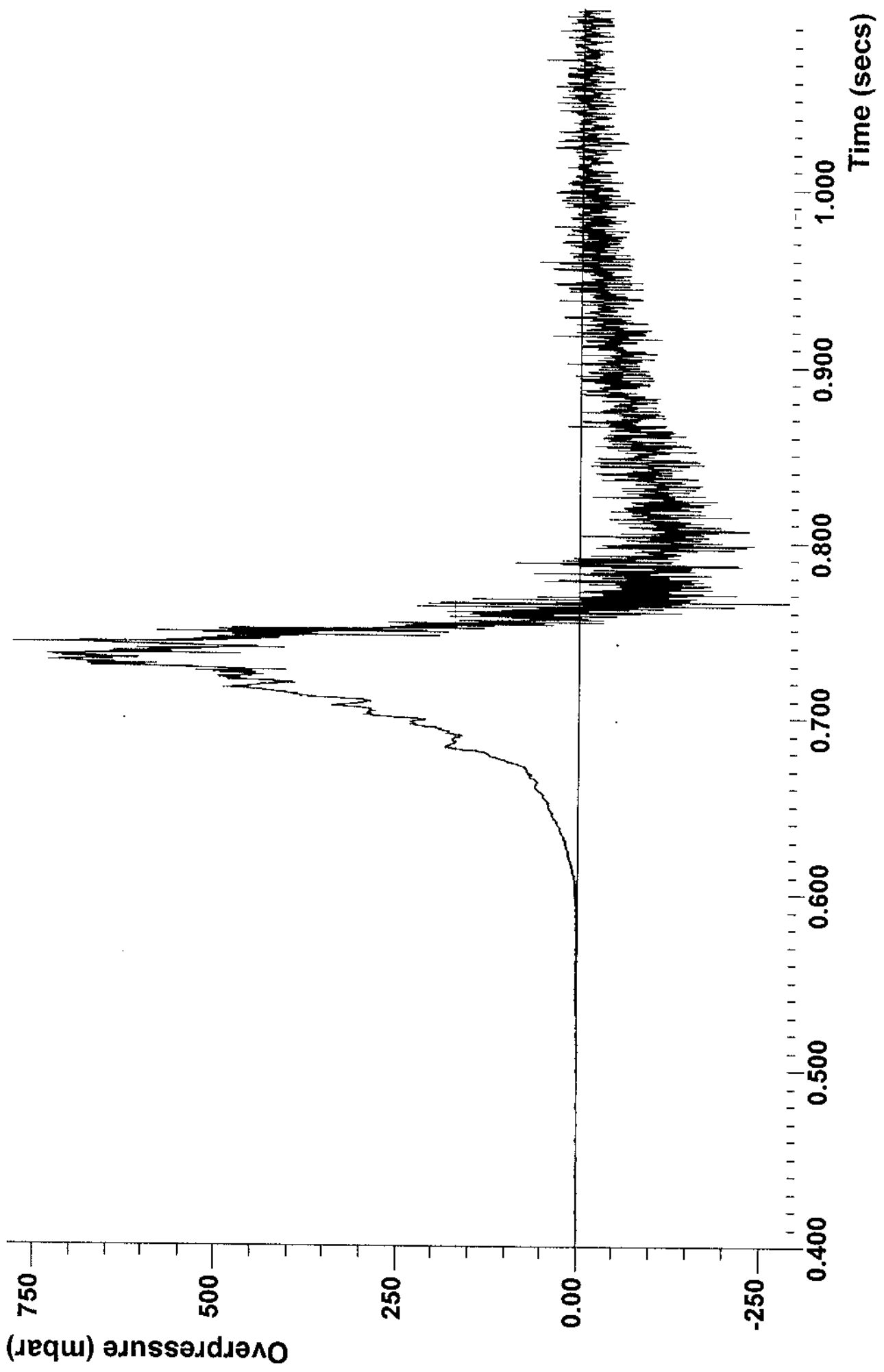
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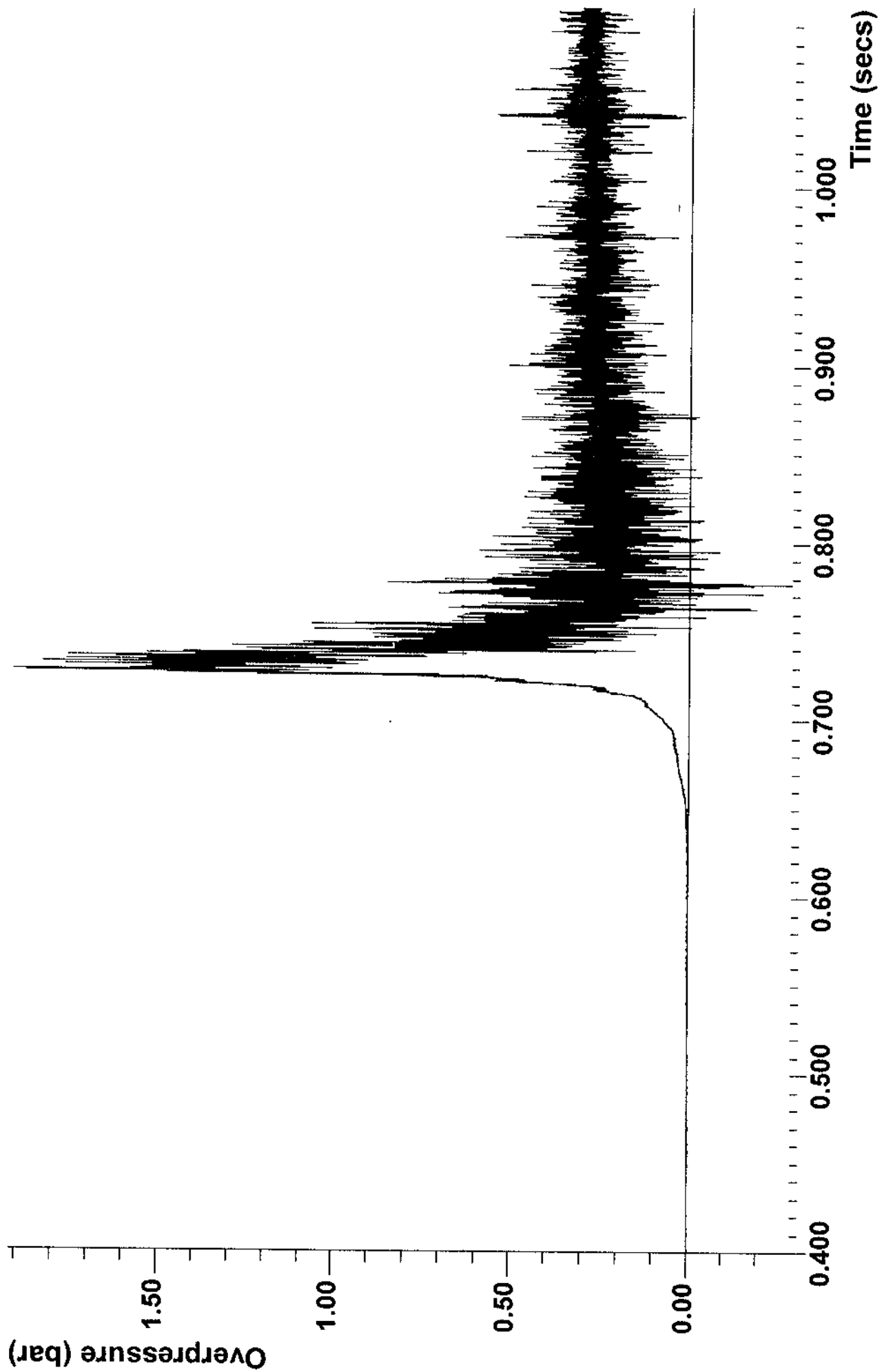
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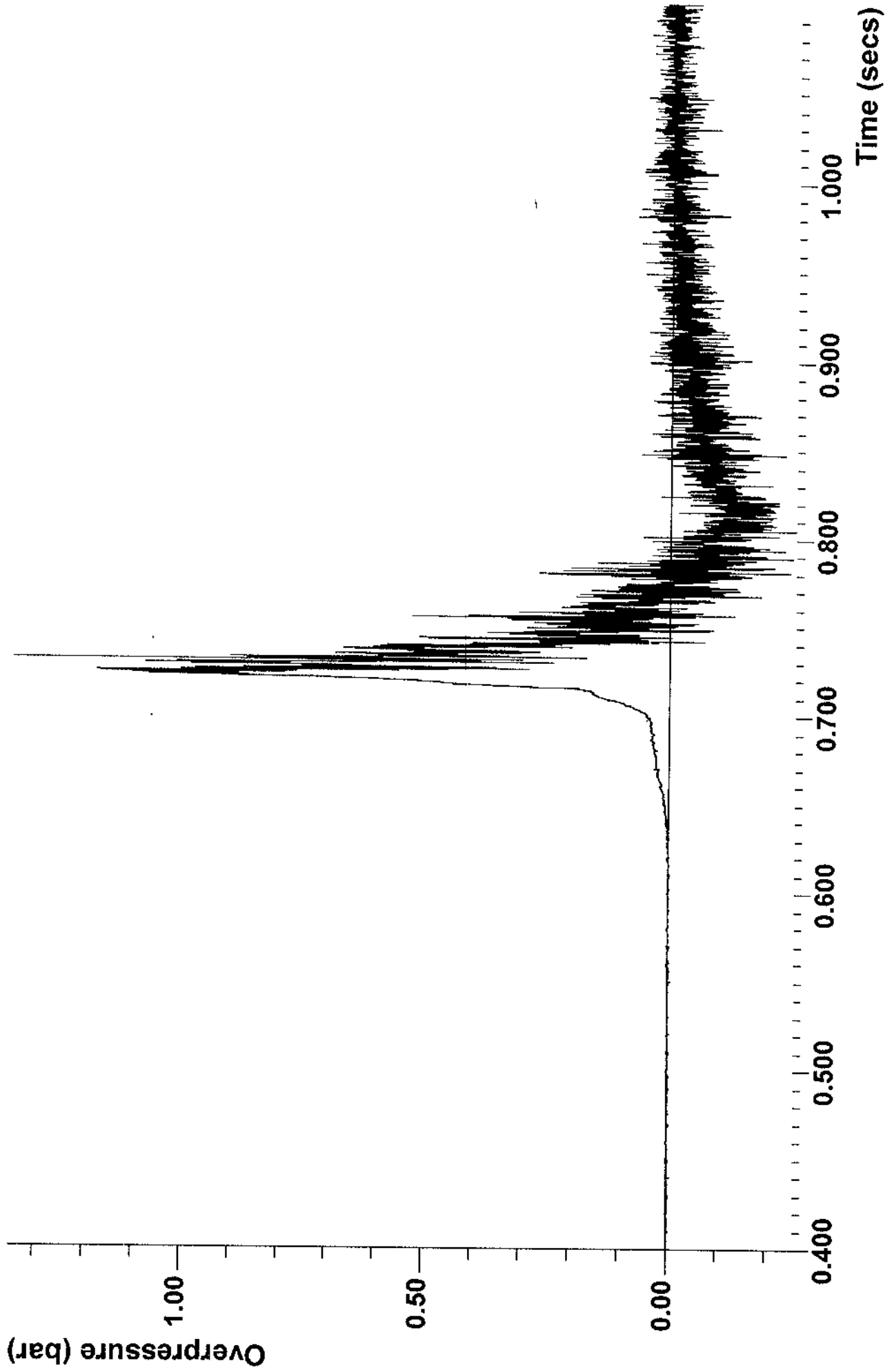
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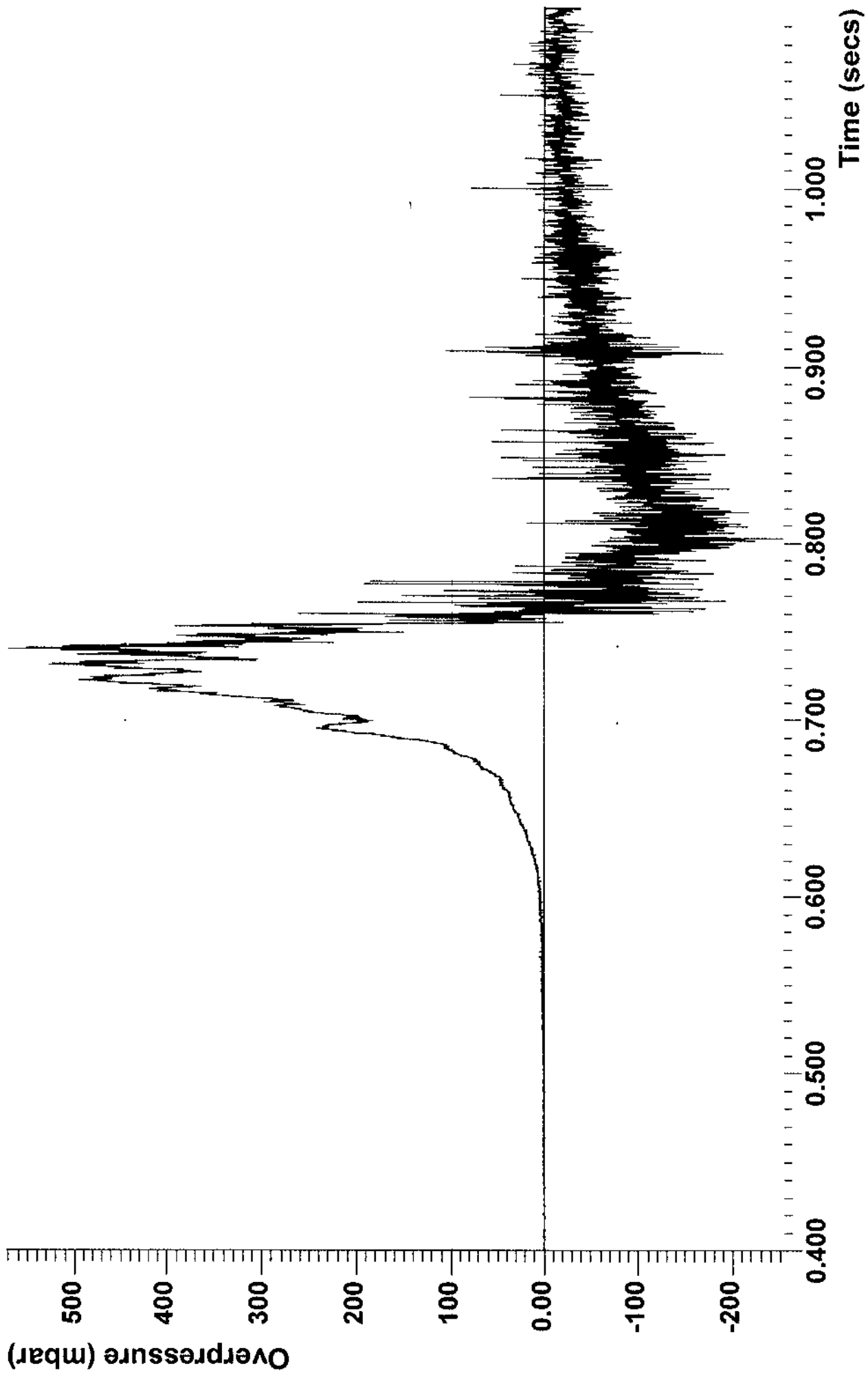
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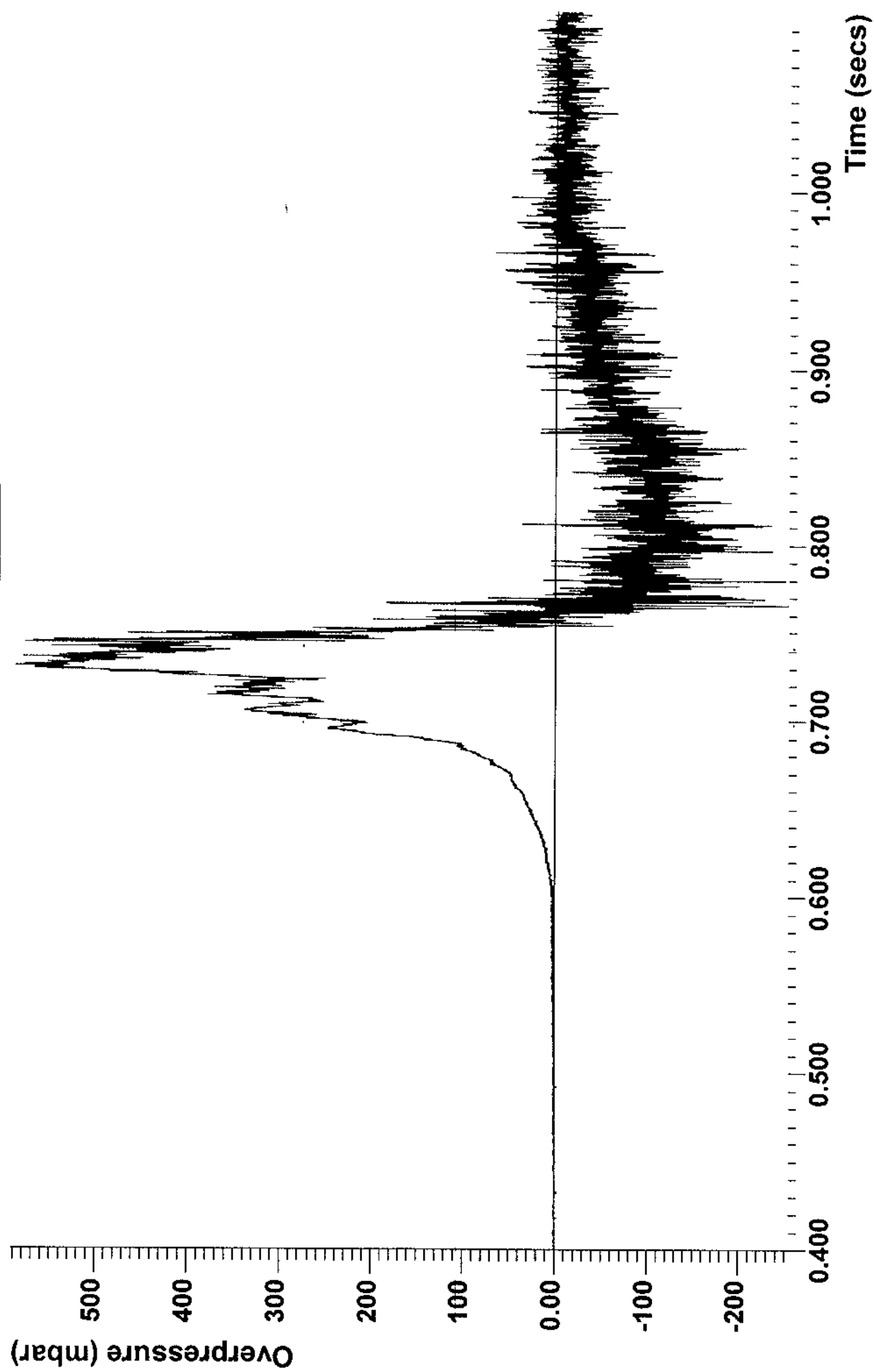
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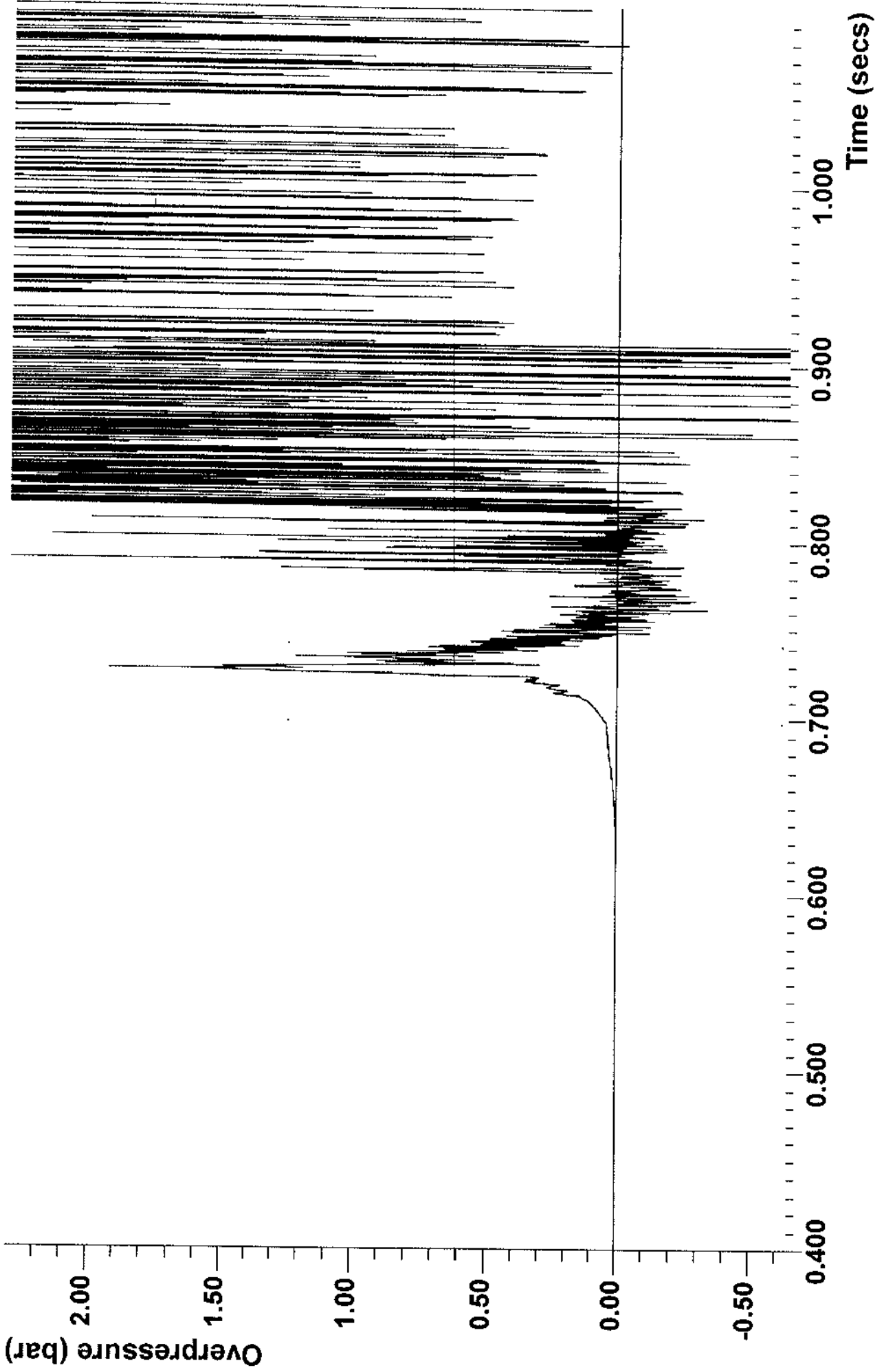
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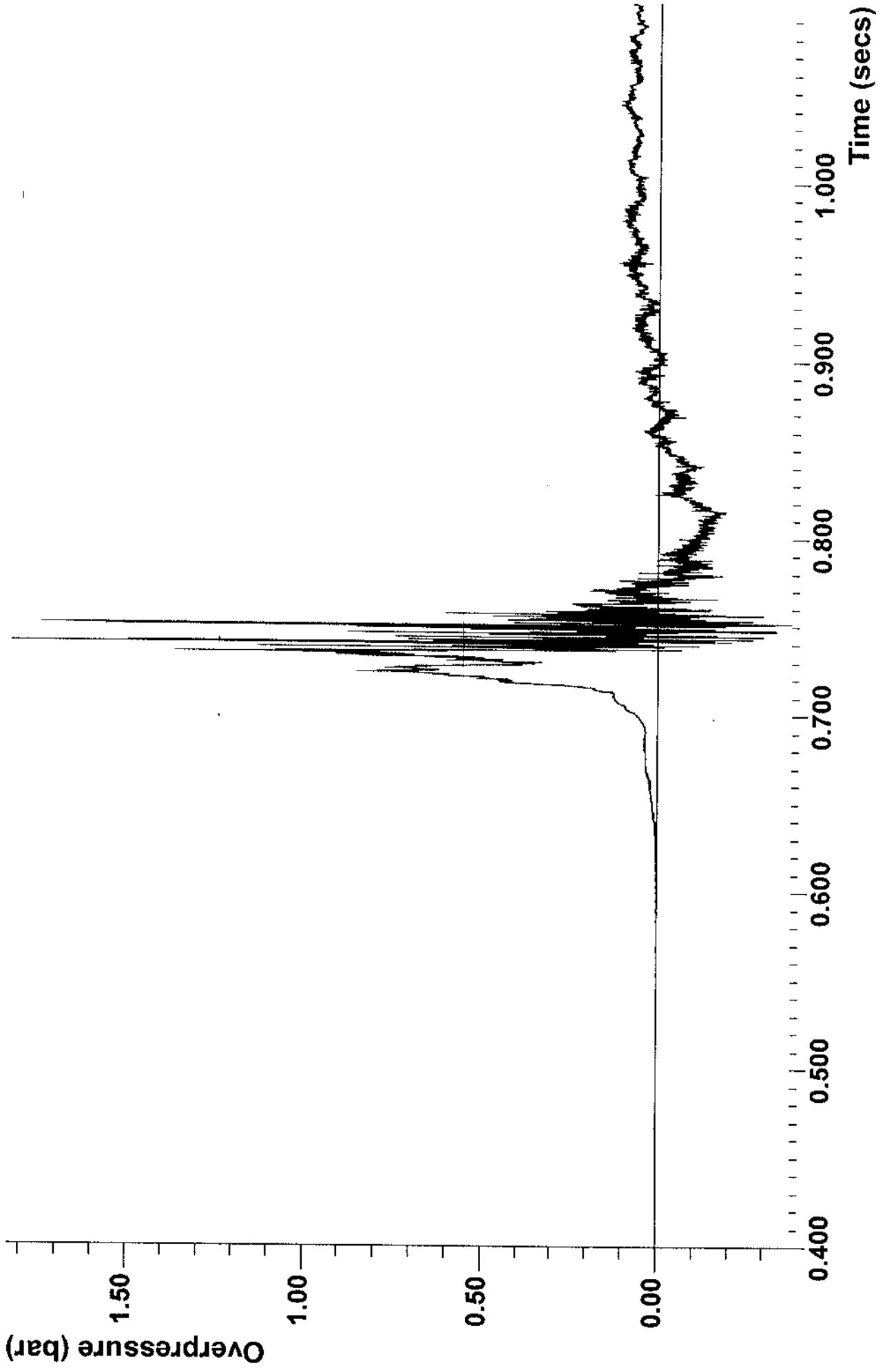
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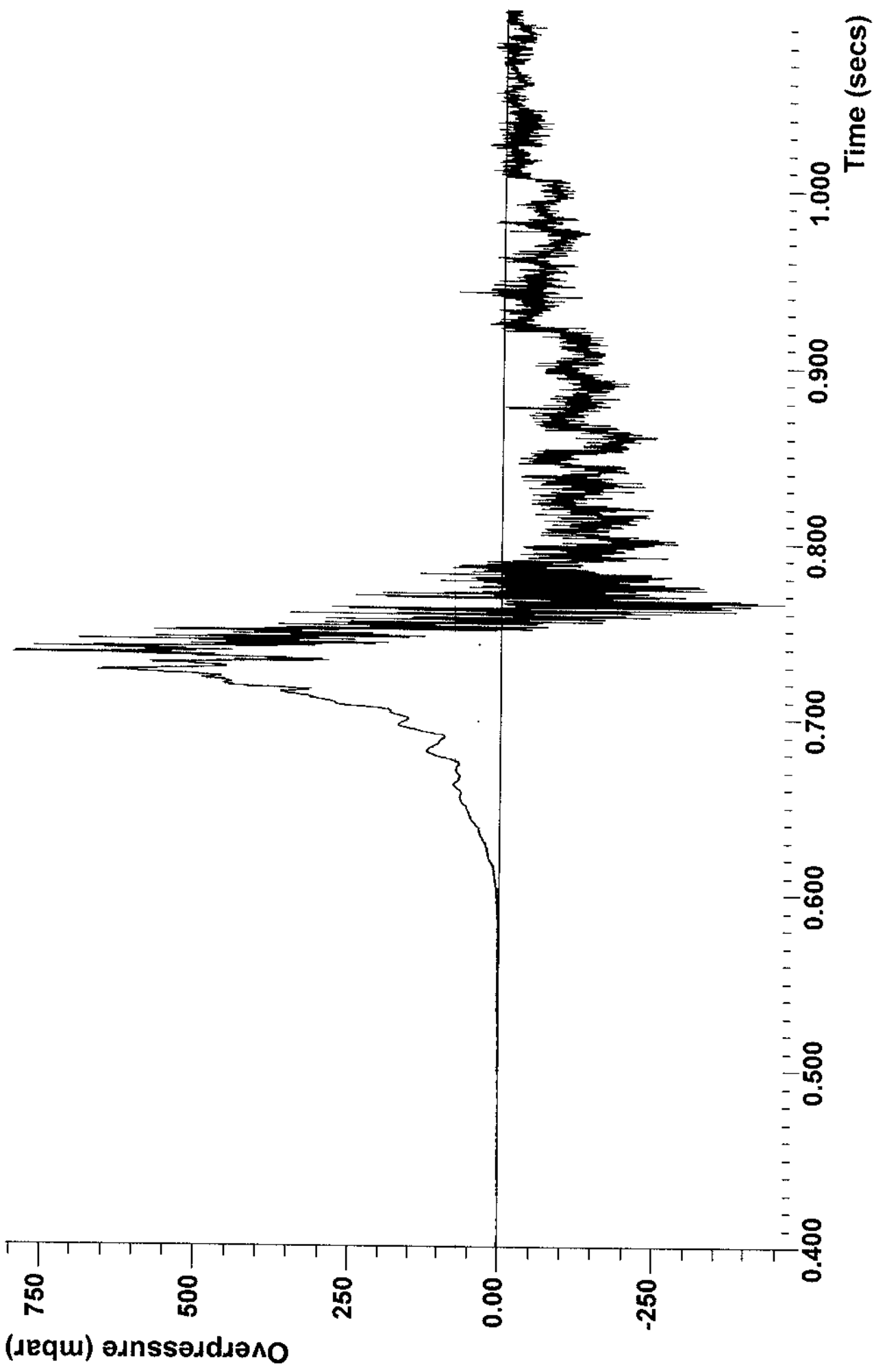
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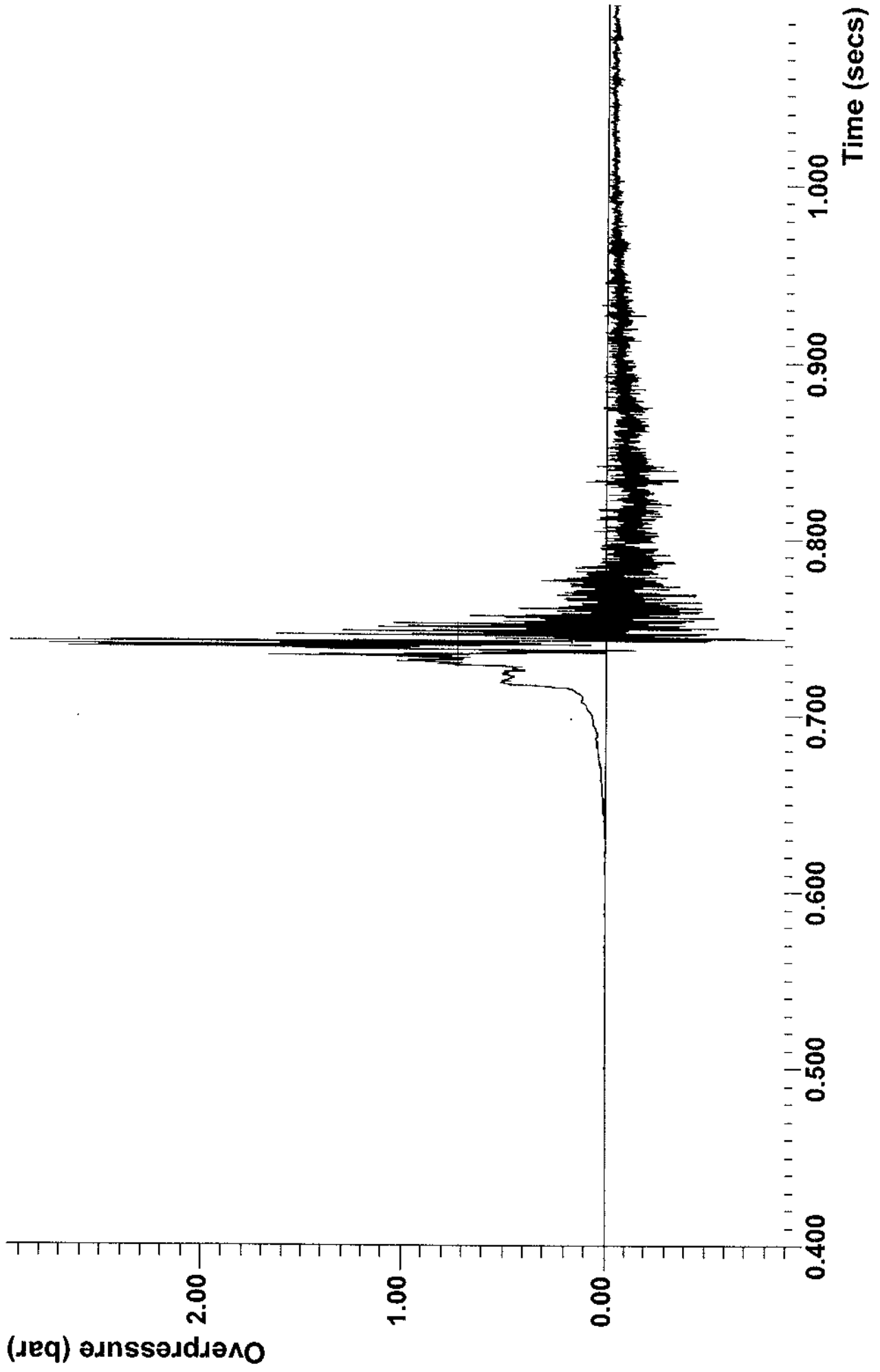
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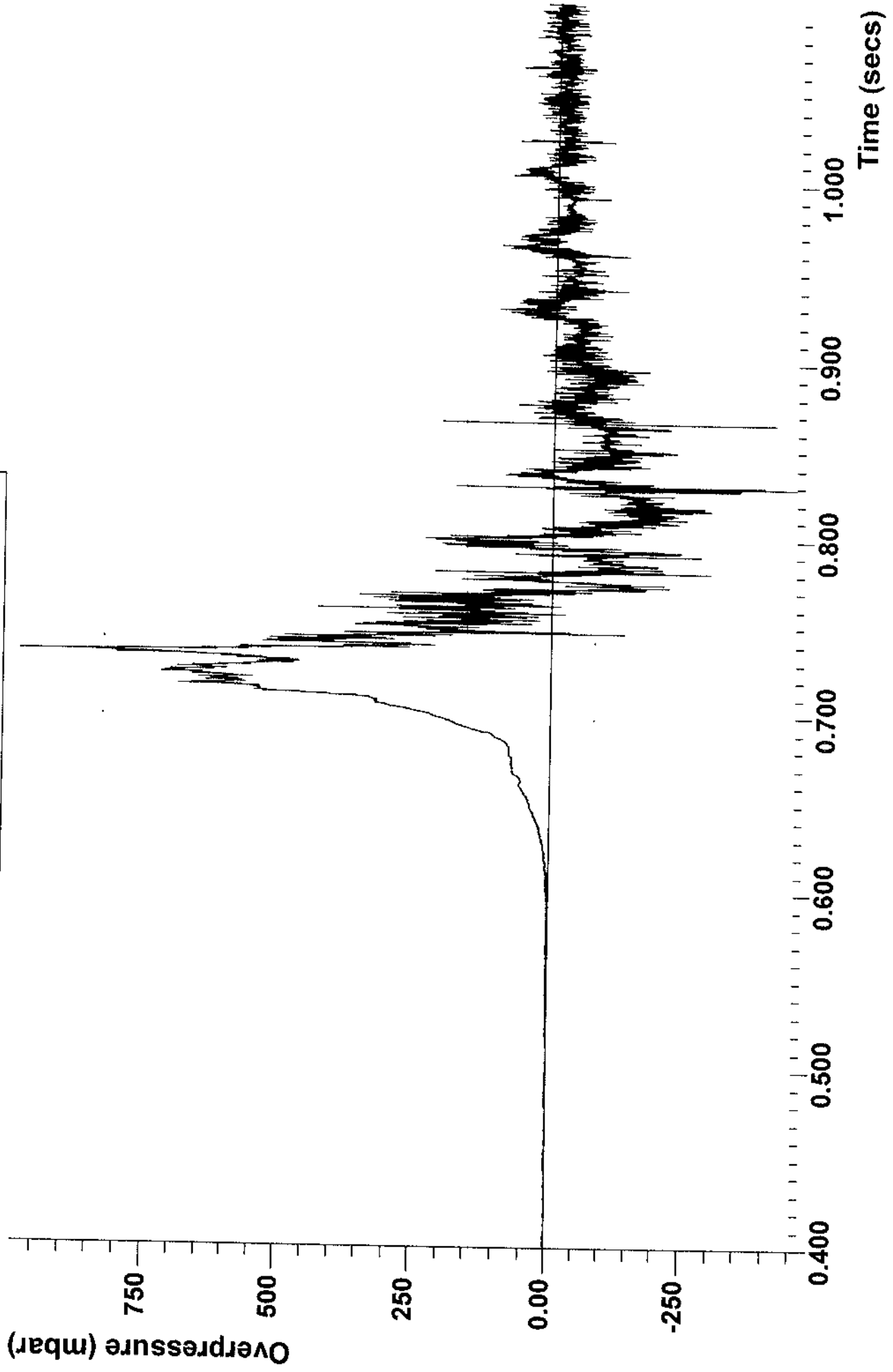
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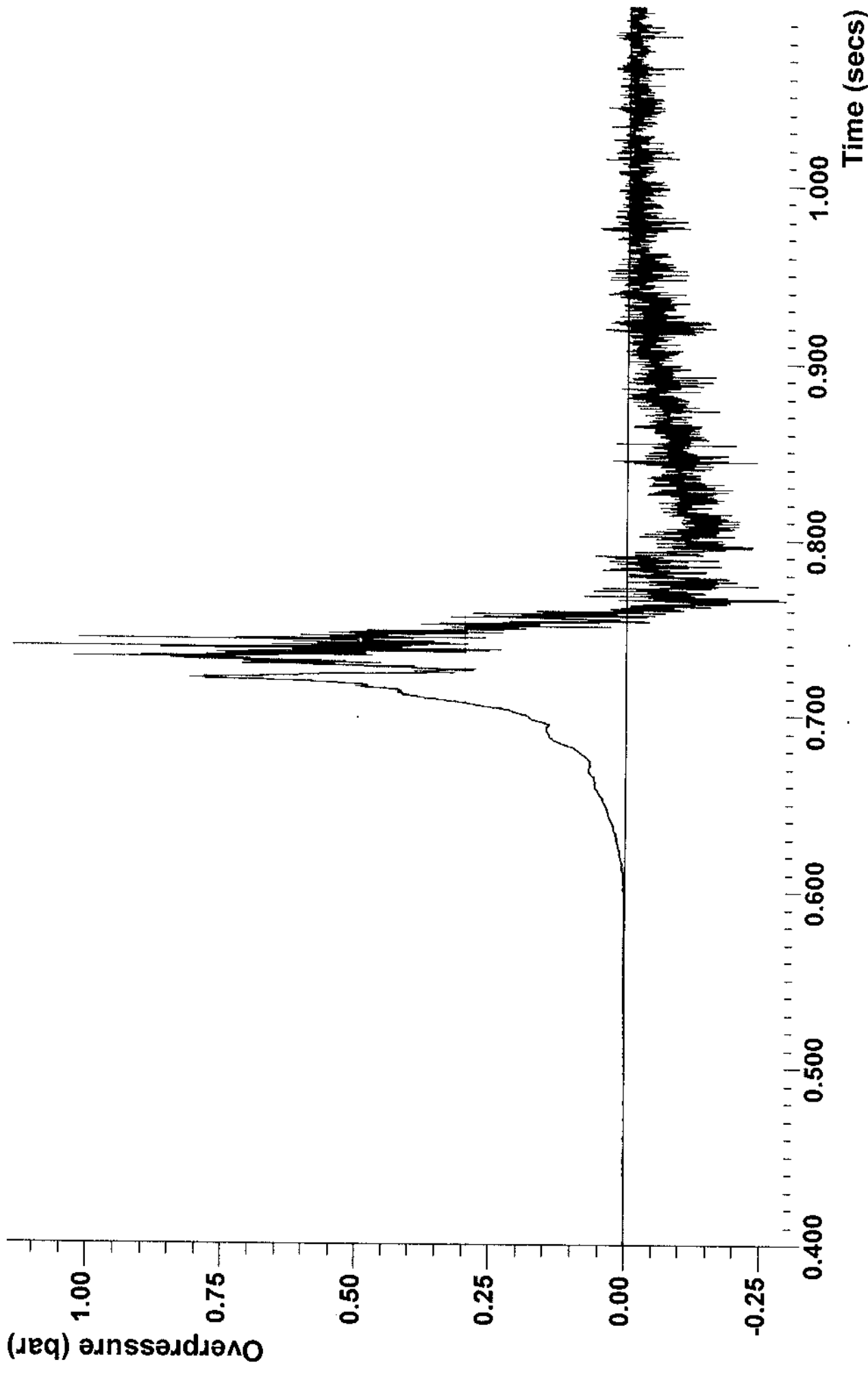
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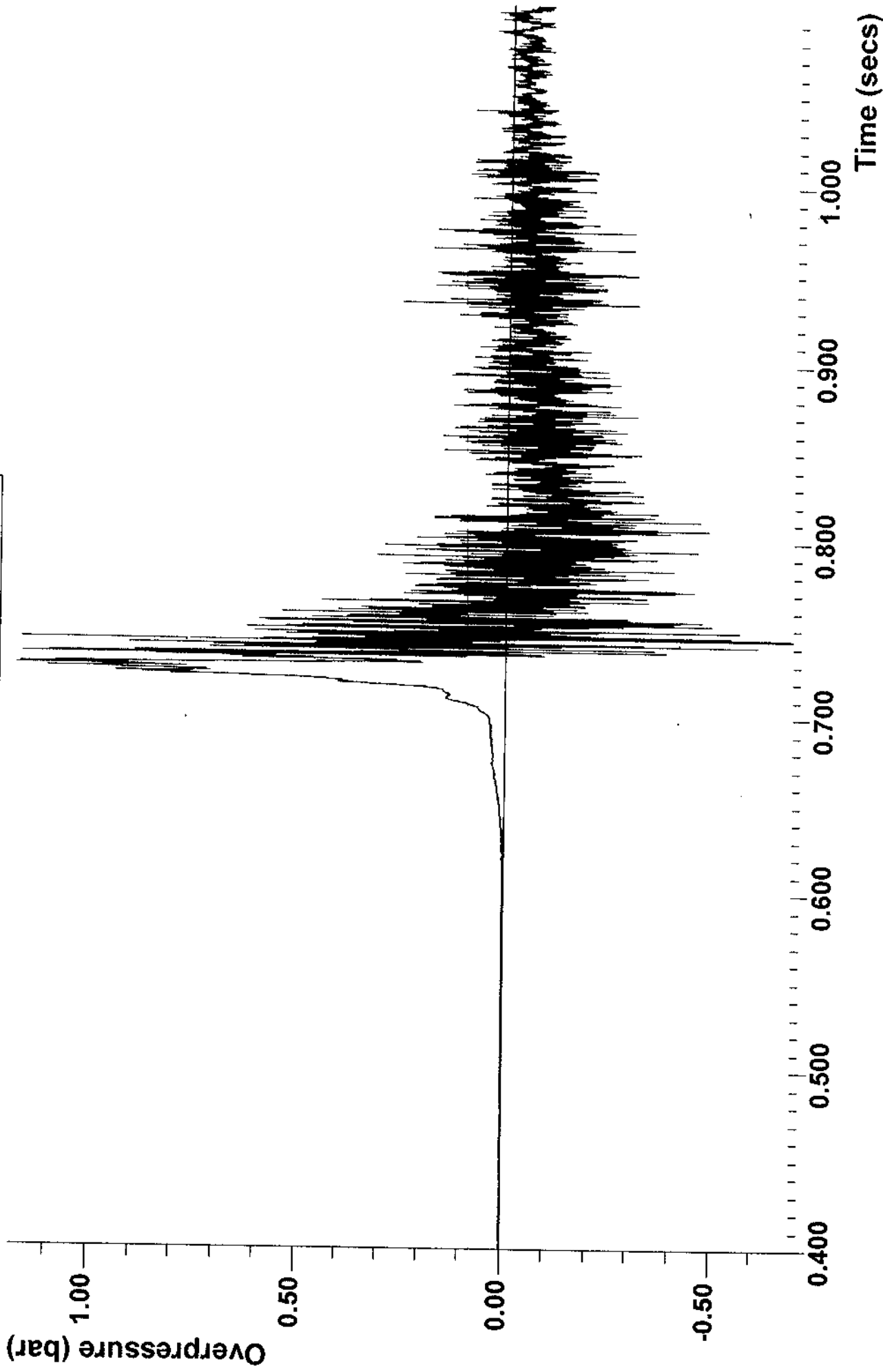
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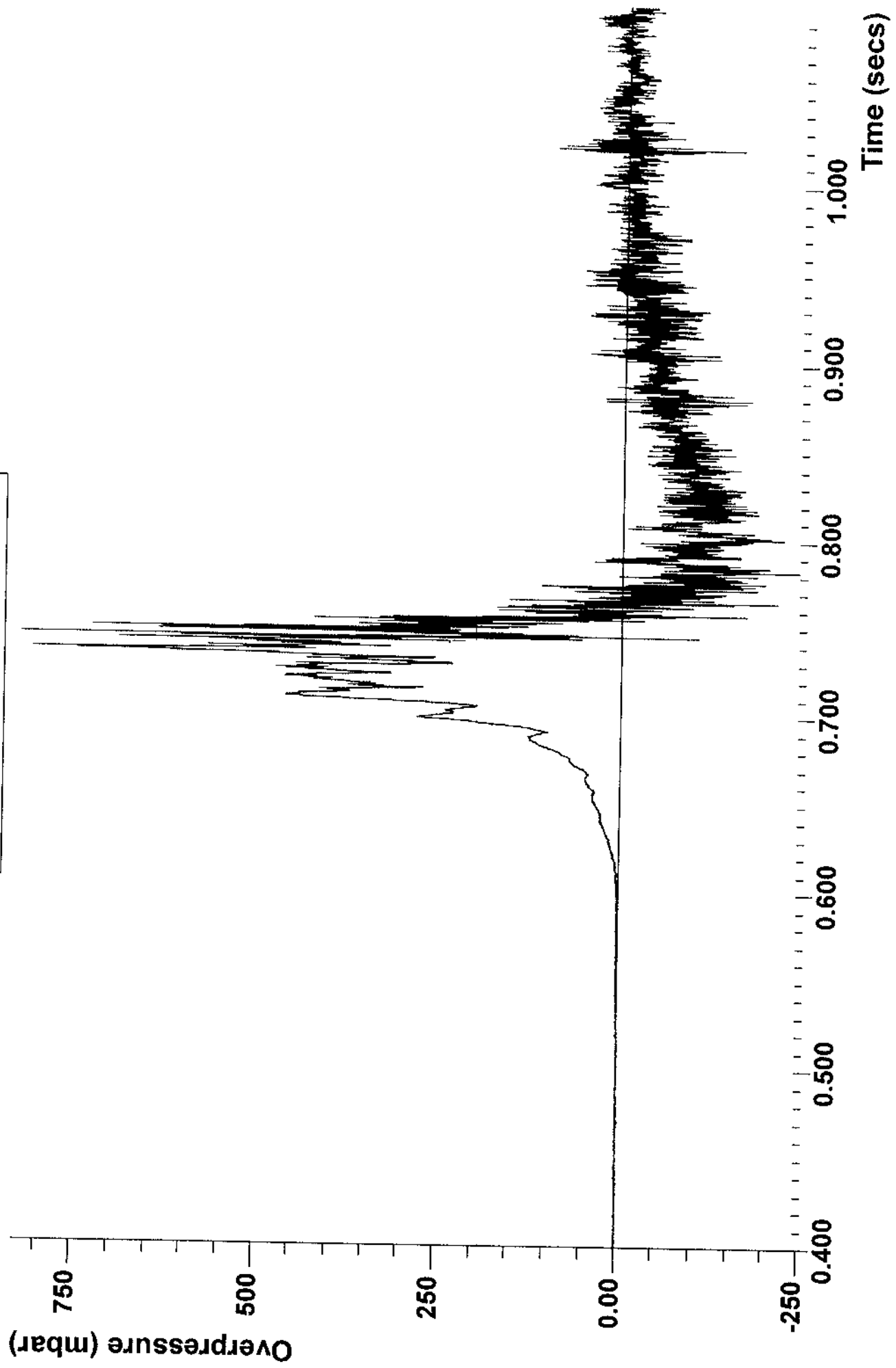
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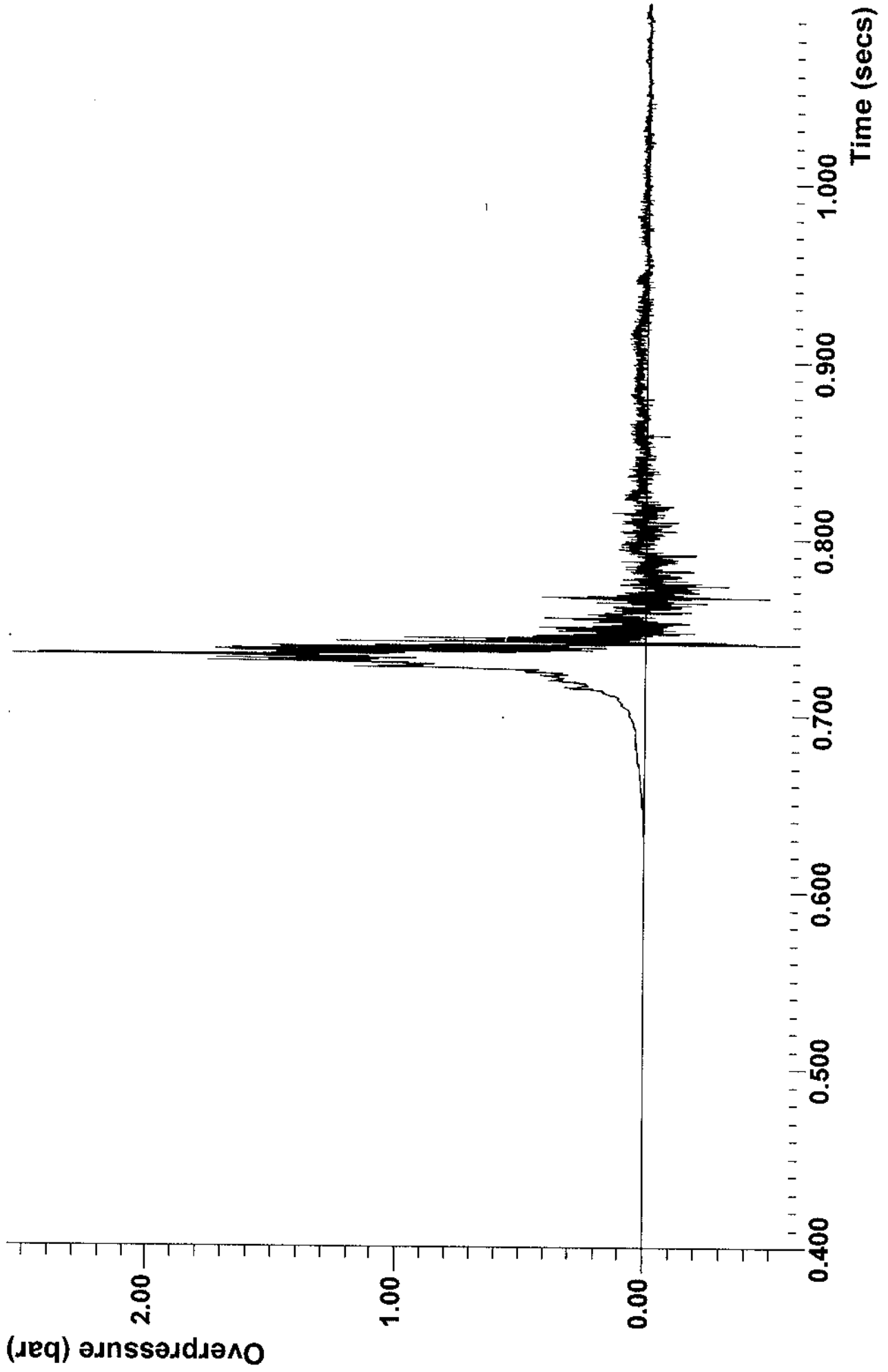
Test: HSE 1 (O1, C1, I1)
Transducer no: PI-33



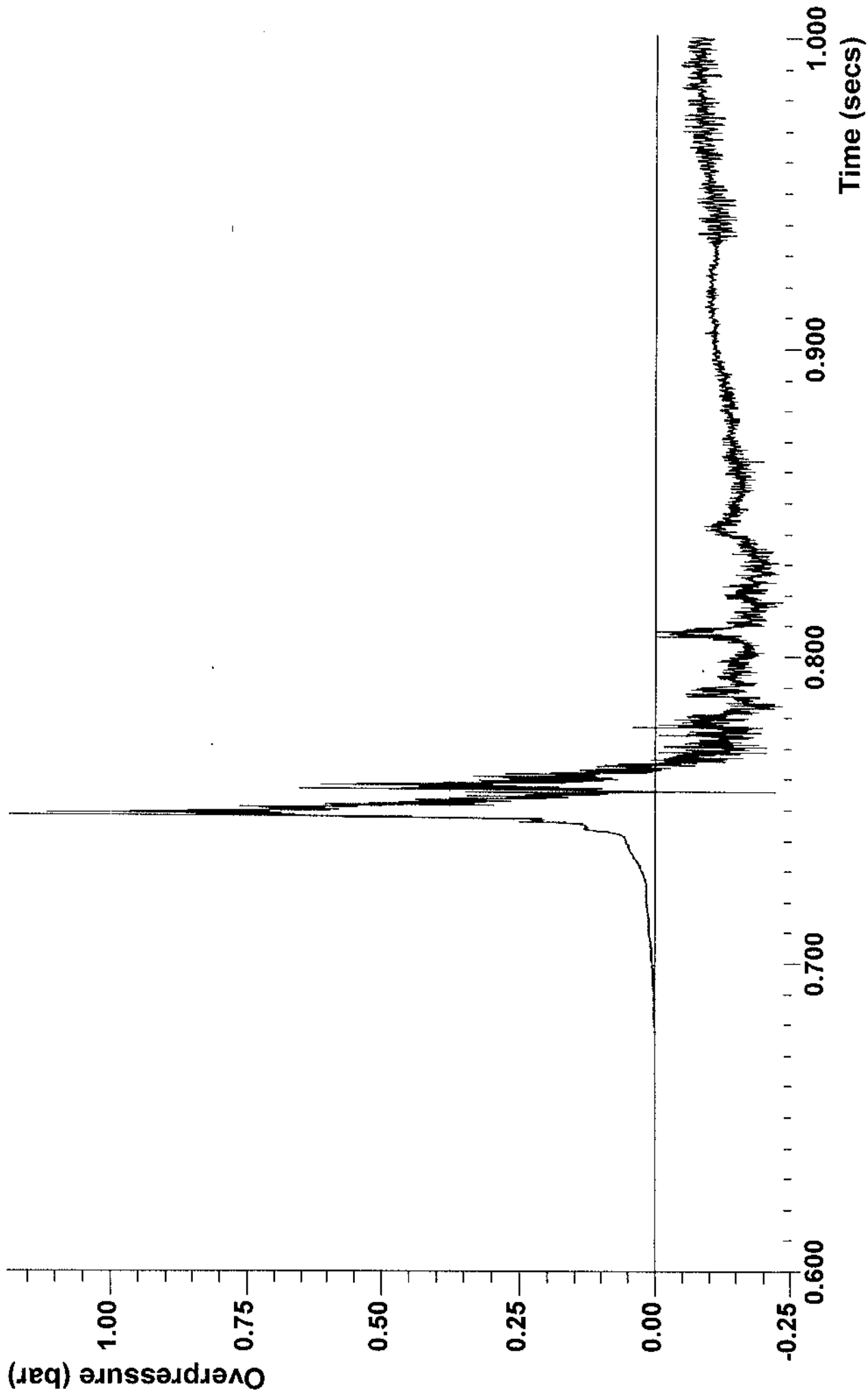
Test: HSE 1 (O1, C1, I1)
Transducer no: PI-34



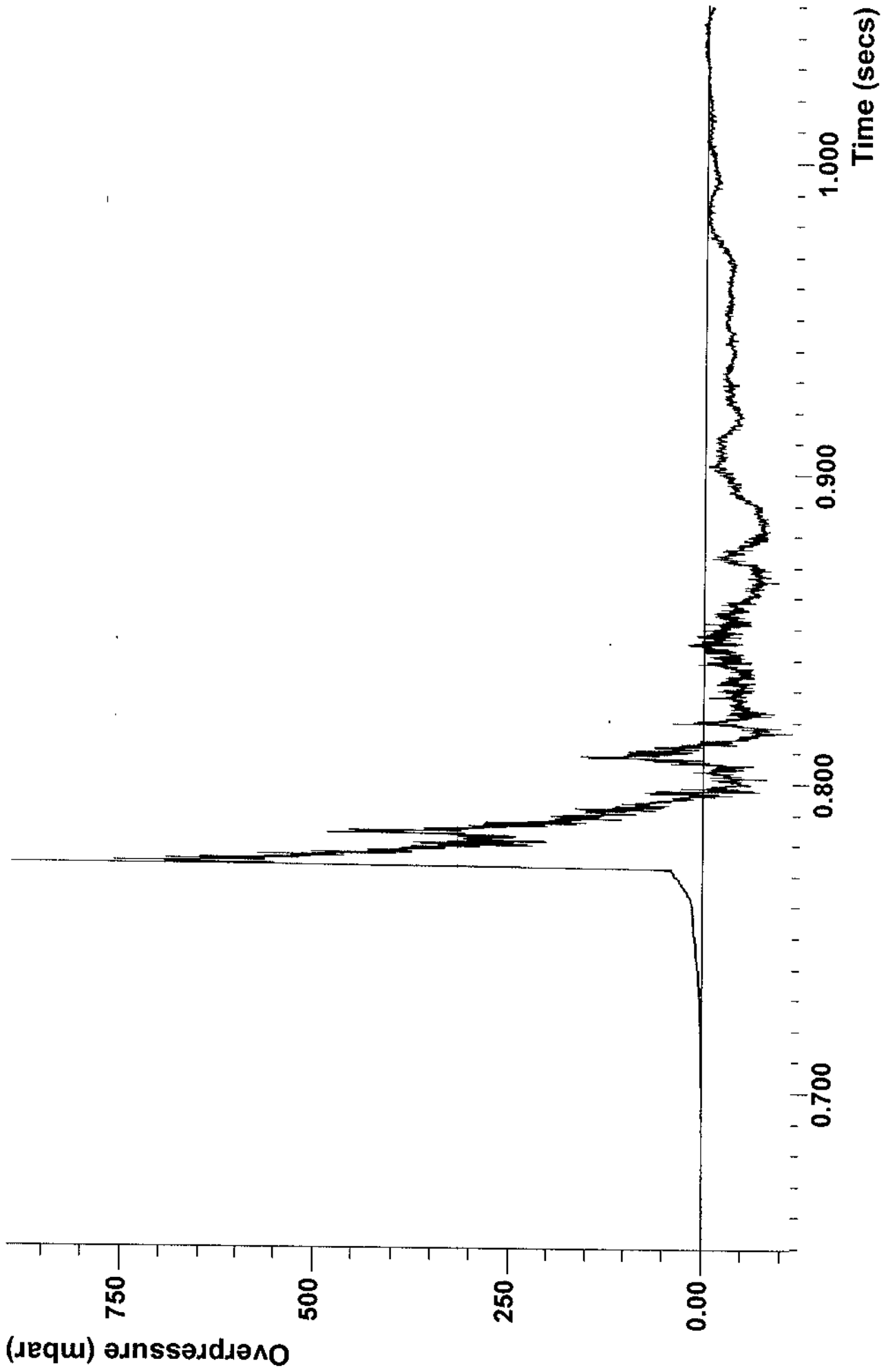
Test: HSE 1 (O1, C1, I1)
Transducer no: PI-35



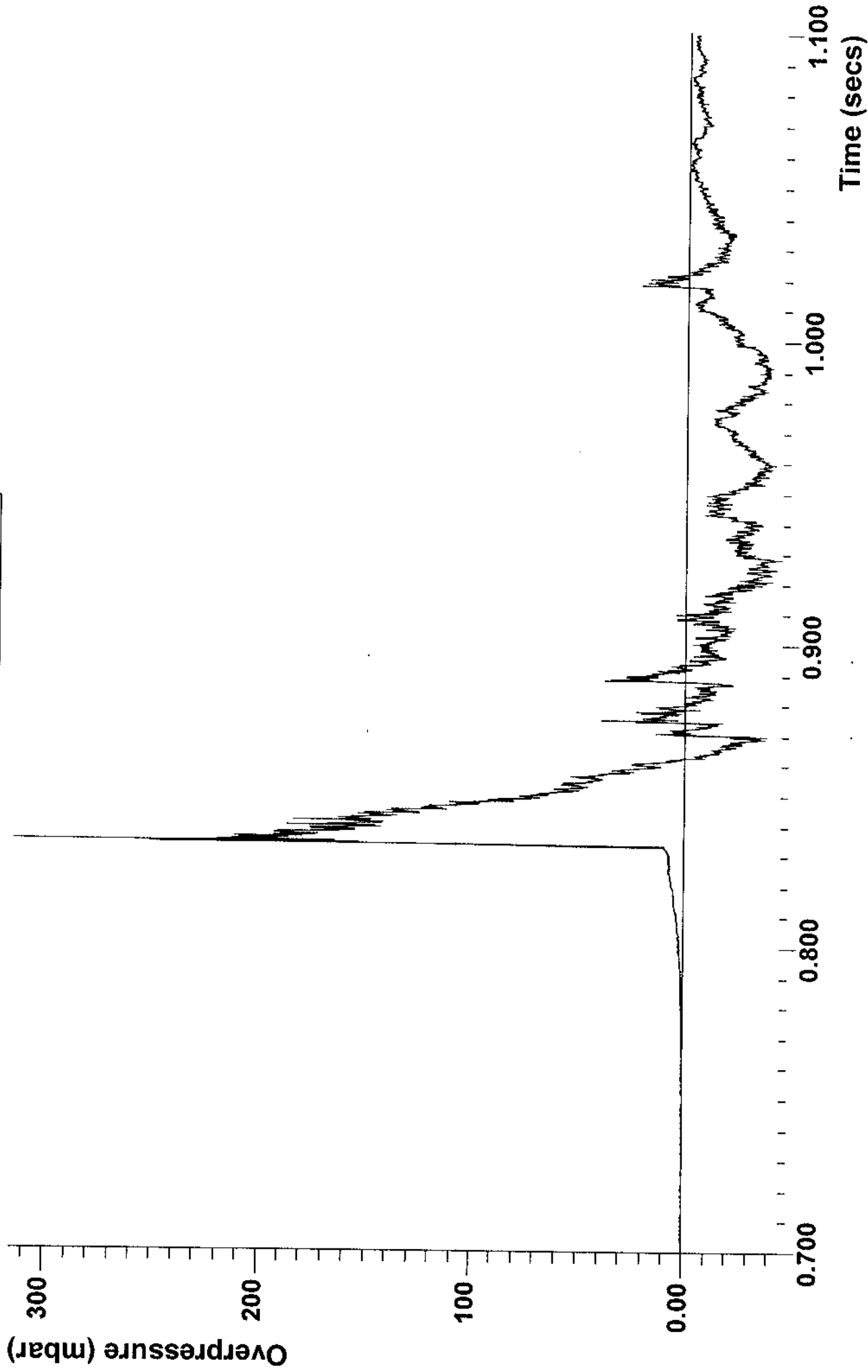
Test: HSE 1 (O1, C1, I1)
Transducer no: PE-2



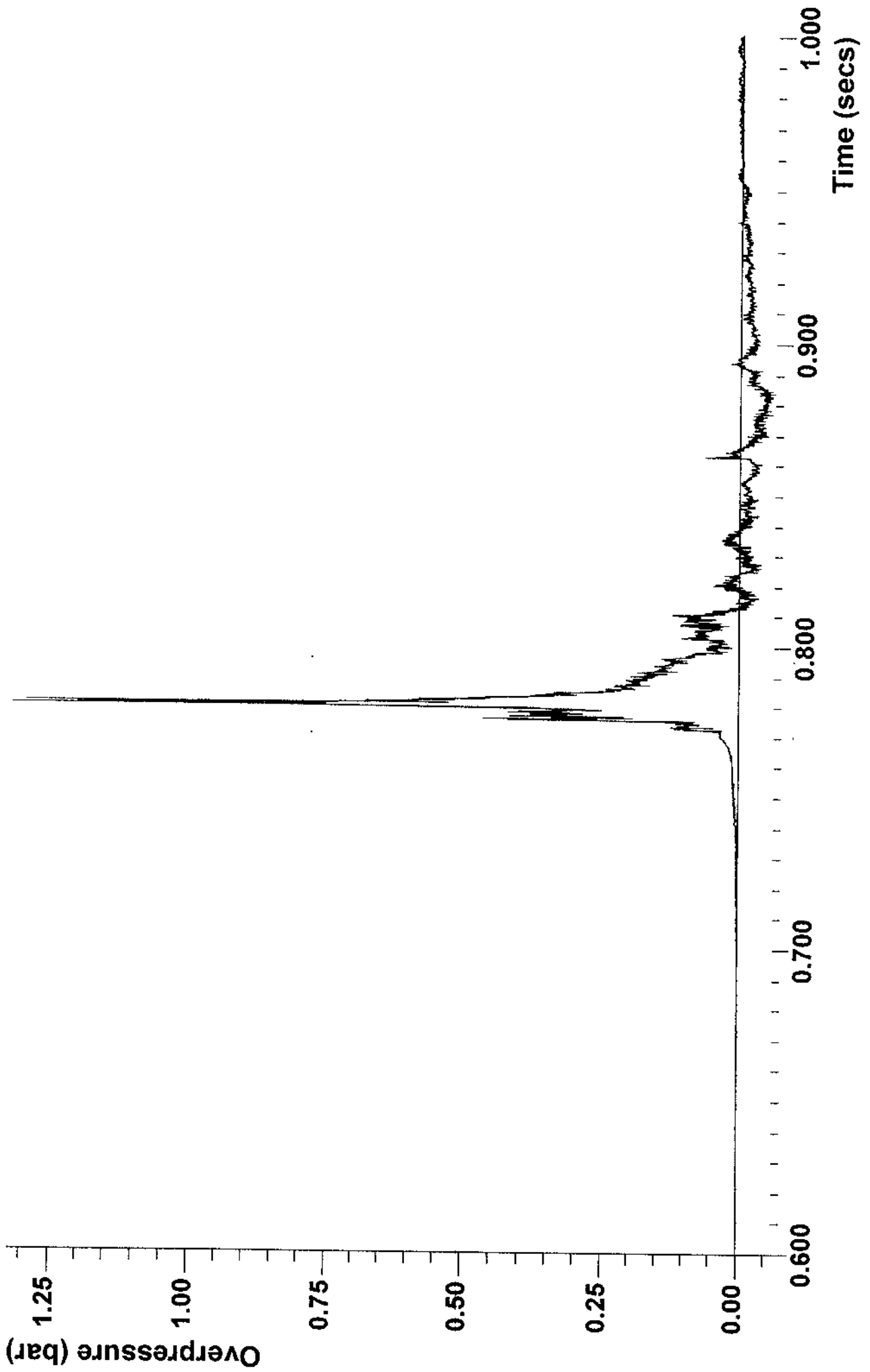
Test: HSE 1 (O1, C1, I1)
Transducer no: PE-3



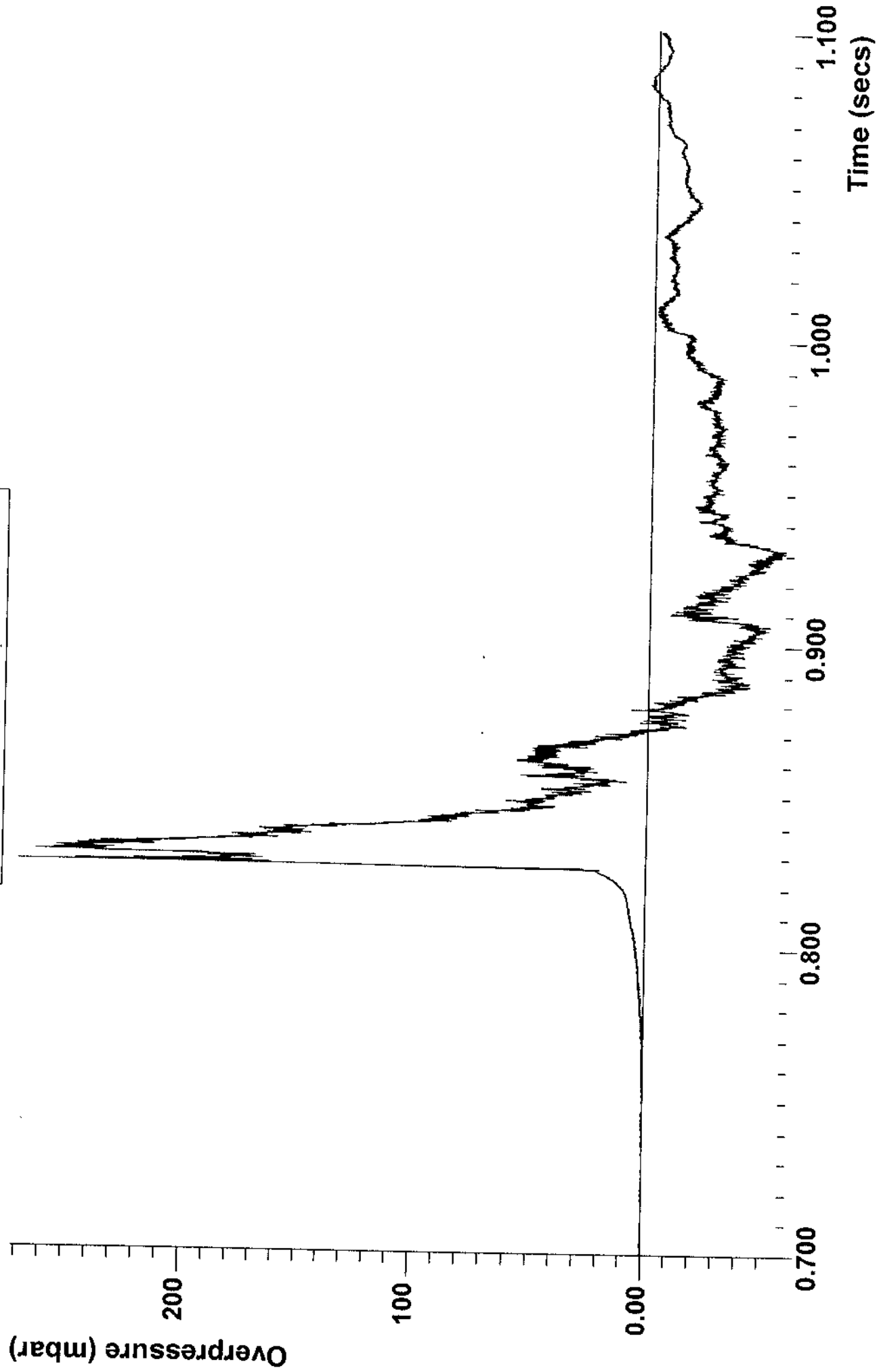
Test: HSE 1 (O1, C1, I1)
Transducer no: PE-4



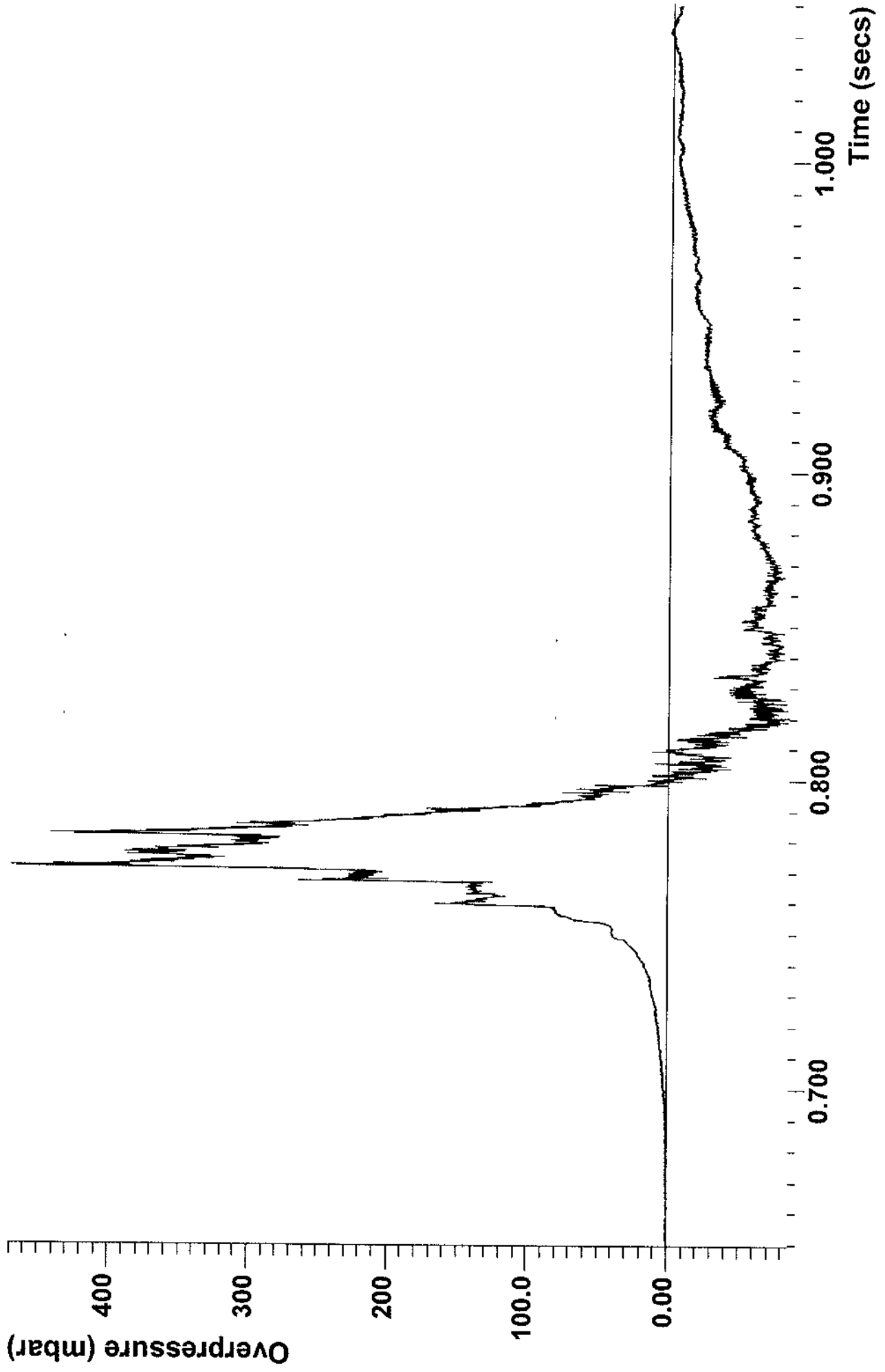
Test: HSE 1 (O1, C1, I1)
Transducer no: PE-5



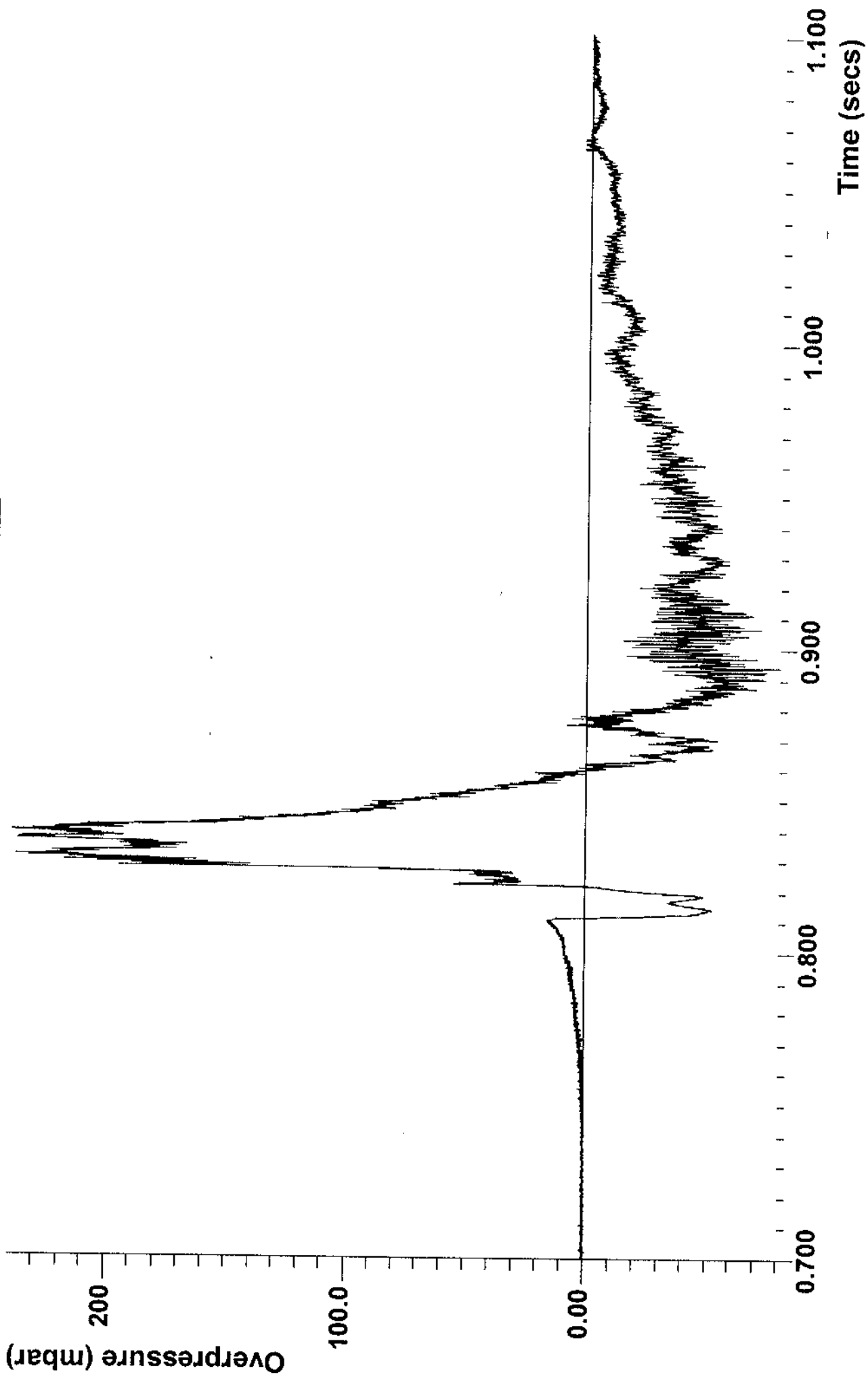
Test: HSE 1 (O1, C1, I1)
Transducer no: PE-6



Test: HSE 1 (O1, C1, I1)
Transducer no: PE-9



Test: HSE 1 (O1, C1, I1)
Transducer no: PE-10



Test: HSE 1 (O1, C1, I1)
Transducer no: PE-11

