<u>EE 245</u>: Introduction to MEMS <u>Lecture 13m1</u>: Mechanics of Materials

CTN 10/4/12







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Material	Density, p,	Modulus, E,	Ε/ ρ	(m/s) ↓		
	Kg/m ³	GPa	GN/kg-m	∫(E/ρ) i		
Silicon	2330	165	72	acoustic velocity		
Silicon Oxide	2200	73	36			
Silicon Nitride	3300	304	92	1		
Nickel	8900	207	23			
Aluminum	2710	69	25			
Aluminum Oxide	3970	393	99			
Silicon Carbide	3300	430	130	1		
Diamond	3510	1035	295	1		



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Stored mechanical energy						
Material	Modulus, E, GPa	Useful Strength*, σ _r , MPa	$\frac{\sigma_f}{E}$ (-) x 10 ⁻³	$\underbrace{\frac{\sigma_f^2}{E}}_{\text{MJ/m^3}}$		
Silicon	165	4000	24	97		
Silicon Oxide	73	1000	13	14		
Silicon Nitride	304	1000	3	4		
Nickel	207	500	2	1.2		
Aluminum	69	300	4	1.3		
Aluminum Oxide	393	2000	5	10		
Silicon Carbide	430	2000	4	9.3		
Diamond	1035	1000	1	0.9		



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(TED Loss)







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