Smart Materials and Structures

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Smart Materials:

- Responsive in some useful (and often non-intuitive) way to some stimulus or stimuli
- Can be passive, active, or both
- Common examples include:
  - shape memory alloys
  - electrochromic windows
  - self-healing structures
  - ...
Don’t anthropomorphize materials...

They hate that.
<table>
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<tr>
<th>Input</th>
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<th>Thermal</th>
<th>Electrical</th>
<th>Optical</th>
<th>Magnetic</th>
<th>Chemical</th>
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<td>elastic modulus, hardness</td>
<td>mechano-caloric</td>
<td>piezoelectric</td>
<td>triboluminescence</td>
<td>magnetostriction</td>
<td>mechanochem</td>
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<td>thermal expansion</td>
<td>heat capacity, thermal conduction</td>
<td>thermoelectric</td>
<td>emissivity</td>
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<tr>
<td>Electrical</td>
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<td>Peltier</td>
<td>conductivity, permittivity</td>
<td>LED</td>
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<td>electrochemistry</td>
<td>chemiluminescence</td>
<td>redox mag</td>
<td>reactions</td>
</tr>
</tbody>
</table>
Any sufficiently advanced technology is indistinguishable from magic.

Arthur C. Clarke