Nano strain gauge

High sensitivity
High resistance
Miniaturized active area
Nanoparticles for measurement applications

The nano strain gauge technology

Nanolike develops a new technology of nanoparticle-based nanosensors. Thanks to the physical properties at nanoscale, nano strain gauges allow to measure very thin deformations with both very low size and electrical consumption.

Example of a nano strain gauge (successive zooms)

Controlled deposition of nanoparticles between two gold electrodes make very high sensitivity resistive nanosensors.
The benefits of nanotechnologies

High sensitivity
With a gauge factor of 30, nano strain gauges bring an extremely high sensitivity for your measurements:

Comparison of the resistance variation

<table>
<thead>
<tr>
<th>Material</th>
<th>Relative resistance variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nano strain gauge</td>
<td>6%</td>
</tr>
<tr>
<td>Metallic gauge</td>
<td>0%</td>
</tr>
</tbody>
</table>

High resistance
With nominal resistances up to 1MΩ, nano strain gauges have a very low electrical consumption less than 1 µW.

Comparison of the electrical consumption of different strain gauge technologies.

<table>
<thead>
<tr>
<th>Material</th>
<th>Electrical consumption (µW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanosensor</td>
<td>µW</td>
</tr>
<tr>
<td>Foil gauge</td>
<td>10 mW</td>
</tr>
<tr>
<td>Semiconductor gauge</td>
<td>mW</td>
</tr>
</tbody>
</table>

More sensitive sensors
Thanks to its very high gauge factor of 30, you can increase the sensitivity of your sensors.

Autonomous sensors
The very low electrical consumption of the nano strain gauges allows you to make very precise and localized deformation measures.

Miniaturized active area
With an active area length around 100 µm, nano strain gauges allow you to make very precise and localized deformation measures.

Comparison of the active area surface

<table>
<thead>
<tr>
<th>Material</th>
<th>Active area surface (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foil gauge</td>
<td>0.9</td>
</tr>
<tr>
<td>Nano strain gauge</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Technical Specifications

Scheme of a nano strain gauge.

<table>
<thead>
<tr>
<th>Nano strain gauge (ref.)</th>
<th>a – Length of the active area mm (in)</th>
<th>L – Length of the substrate mm (in)</th>
<th>b – Width of the active area mm (in)</th>
<th>w – Width of the substrate mm (in)</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG-UNI-V3-200K</td>
<td>0.1 (0.004)</td>
<td>7 (0.277)</td>
<td>3 (0.118)</td>
<td>6.5 (0.118)</td>
<td>200 kΩ</td>
</tr>
<tr>
<td>NG-UNI-V3-1M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 M kΩ</td>
</tr>
</tbody>
</table>

- Shape of sensor response: \( \Delta R/R_0 = \exp(g.\varepsilon)-1 \)
- Gauge factor: \( g : 30 \)
- Nominal resistance: \( R : 200k\Omega - 1M \Omega \)
- Deformation range: \( \varepsilon : 1 \text{ to } 2000 \mu\text{m}/\text{m} \) (limit: 0.2%)
- Operating temperature: \( T : -40^\circ C \text{ to } +50^\circ C \)

Conditioning

- Polarization voltage: typ. 0.5 – 1.5 V (CC)
- Possible conditioning configurations: Wheatstone bridge (full, half), voltage or current polarization, linear or logarithmic amplifier...

Conditioning with the plug-and-play NanoDAQ®

- Up to 6 nano strain gauges
- Temperature measurement and correction available
- USB serial output

NanoDAQ®: conditioning system for nanosensors
Nano strain gauges can be used for various applications

**Sensors**
Nano strain gauge allows you to design more efficient sensors (weight, force, pressure, torque...) without changing your test body.

**Internet of Things**
Miniaturization and very low energy consumption of nanosensors allows you to integrate them straight in your objects to make them being smart.

**Structure Health Monitoring**
By installing autonomous «patches» of hundreds of nano strain gauges on structures, you can early detect potential failures and prevent them by anticipating operating maintenance.

Get your custom nano strain gauge network

With our patch of nanosensors, you can have your proper design of nanosensor network ready to use in your application.

Save time and money, make your products smarter with our custom-made nano strain networks.