Neue Materialien
Würzburg

Piezo Fiber Sensors and Actuators for Structural Health Monitoring

5th SAMCO Workshop

Wien, 26-27.01.2004

Dr. R. Petricevic (NMW)

Dr. H. Friedmann (WBI)

Dr. F.O. Henkel(WBI)

Dr. F. Schubert (IZFP)

Dr. M. Gurka (NMW)

Why Piezo Fiber Sensor/Actuator

Well Balanced Properties

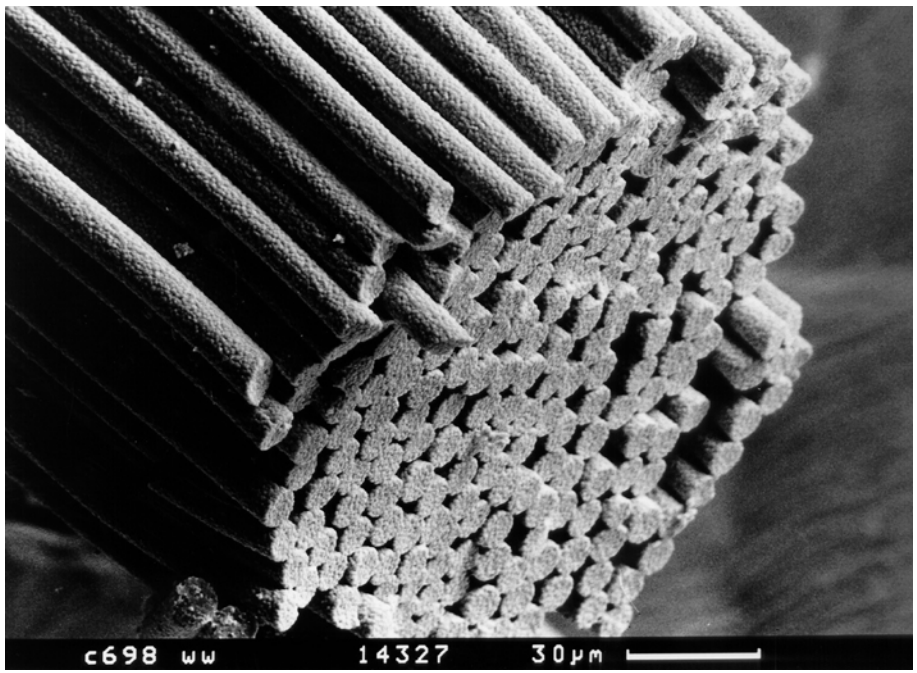
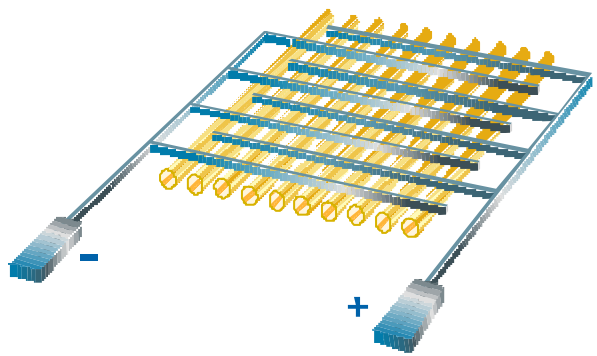


Bild: Fraunhofer ISC

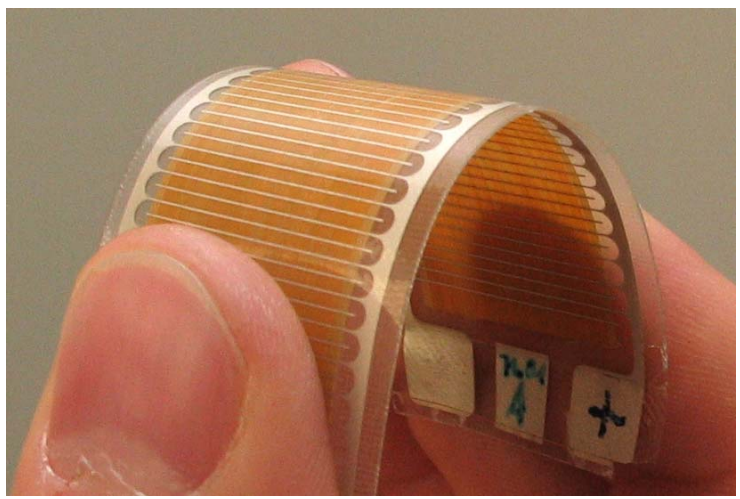
- highly 2-dim integrable
- high mechanical and temperature stability
- large signal-to-noise ratio
- simple data acquisition
- strain gauge compatible patches produceable



Adaptive Piezofiber Patches

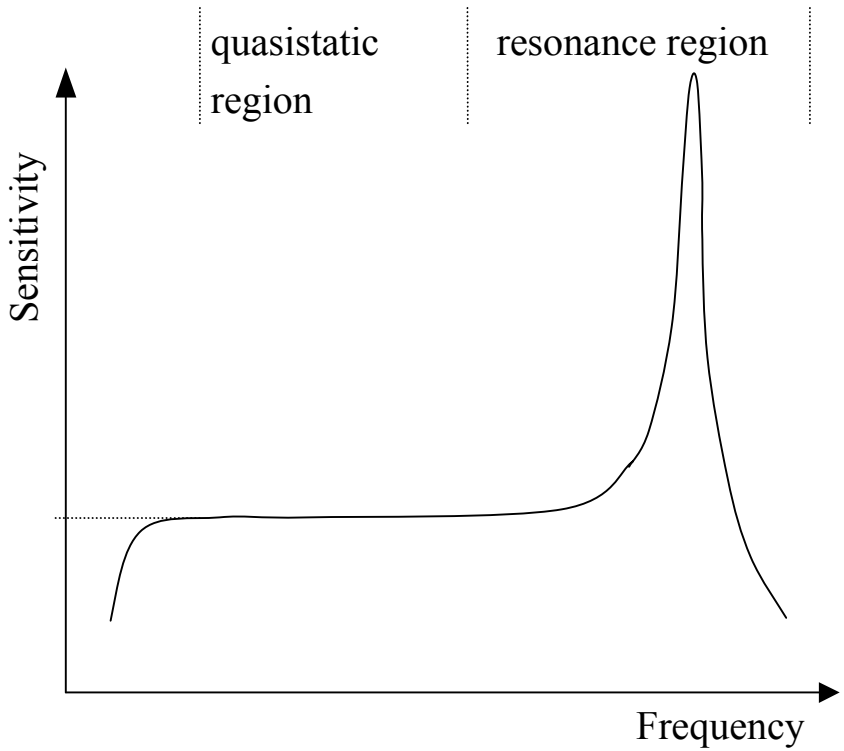
Well Integratable Sensors and Actuators for ...

- direct measurement of mechanic parameters (force, acceleration, strain)
- direction sensitive detection of vibration and load
- implemented ultra-sonic analysis (sender and receiver similarly constructed)
- directed actuation
- Impact detection



Sensitivity vs. Frequency

Bandwith of a Sensor/Actuator



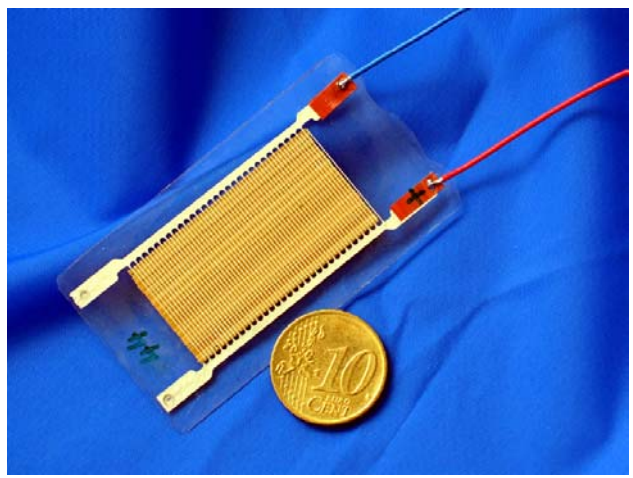
Depends on

- mechanical boundary conditions
- electrical measurement setup

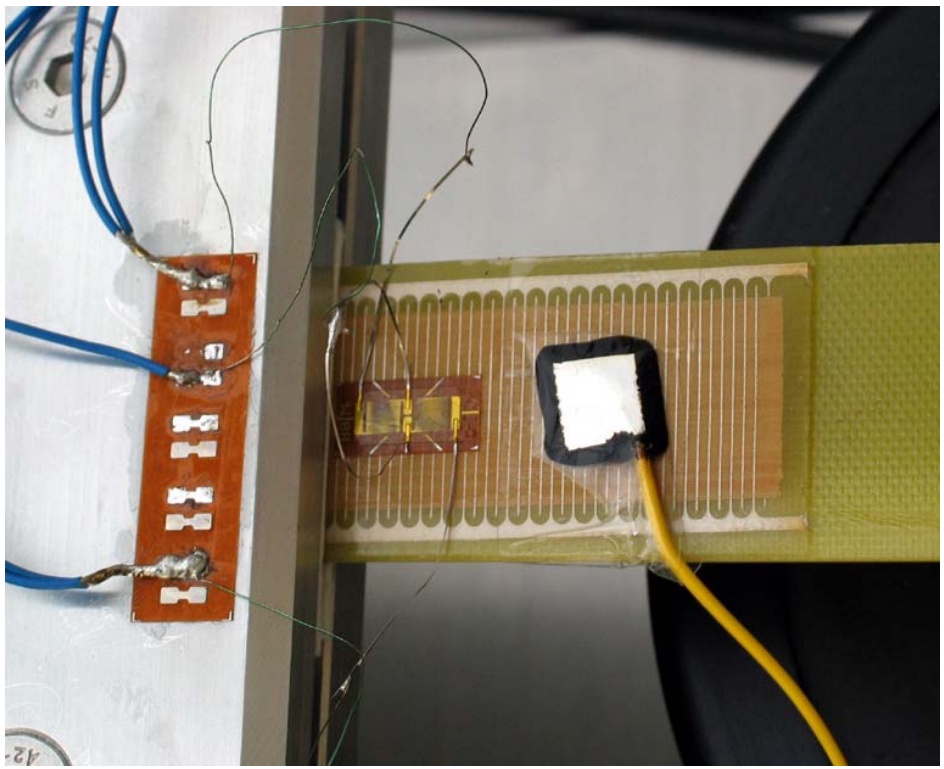
quasistatic region: application area of direct-transducers

resonance region: sensitvity depends on load

→ enables selektive or puls measurements



Further Advantages of a Piezofiber Patch Sensor



- high sensitivity
- no powersupply necessary
- variable geometry (high adaptivity)
- simple 2-wire connection

Piezo Fiber - Sensors

Charge Sensitivity vs. Strain

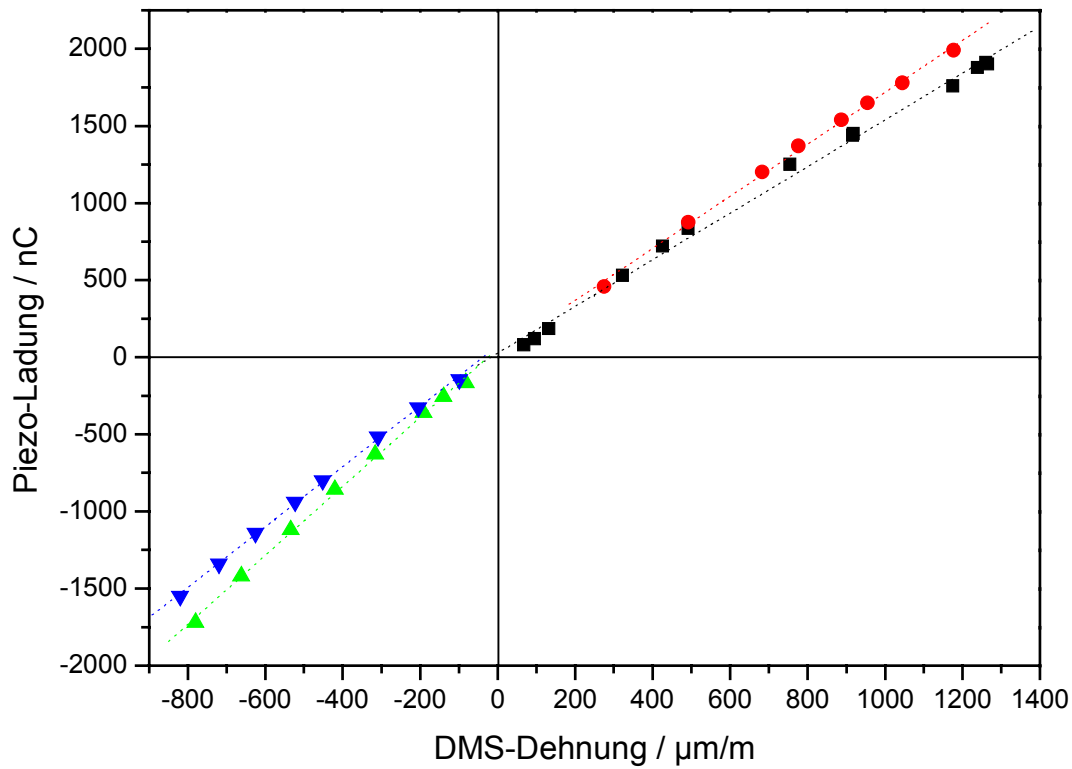
Mittelwerte für

Zugbelastung:

$Q/\varepsilon = 1600$ nC / ‰

Druckbelastung:

$Q/\varepsilon = 2100$ nC / ‰



Piezo Fiber - Sensors

Temperature Coefficient

Versuchsparameter bei Start

Temperatur:	25°C
Shakerfrequenz :	10 Hz
Dehnungsamplitude :	79.2 µm/m
Sensorempfindlichkeit :	870 nC/‰