List of 50 **smart materials**, categorized by type. These materials have unique properties that make them suitable for advanced applications, including self-healing, shape memory, and responsiveness to environmental changes:

**1. Shape-Memory Alloys (SMAs)**

1. Nickel-Titanium (NiTi, Nitinol)
2. Copper-Aluminum-Nickel (Cu-Al-Ni)
3. Iron-Manganese-Silicon (Fe-Mn-Si)
4. Gold-Cadmium (Au-Cd)
5. Silver-Cadmium (Ag-Cd)
6. Copper-Zinc-Aluminum (Cu-Zn-Al)
7. Titanium-Nickel-Copper (Ti-Ni-Cu)
8. Nickel-Aluminum (Ni-Al)
9. Zirconium-Copper (Zr-Cu)
10. Titanium-Niobium (Ti-Nb)

**2. Self-Healing Polymers**

1. Epoxy Resin with Microcapsules
2. Polyurethane
3. Polydimethylsiloxane (PDMS)
4. Polyurea Elastomers
5. Polyanhydrides
6. Polyacrylic Acid (PAA)
7. Polyethylene Glycol (PEG)
8. Diels-Alder-Based Polymers
9. Polyesters with Disulfide Bonds
10. Hydrogels with Reversible Bonds

**3. Piezoelectric Materials**

1. Lead Zirconate Titanate (PZT)
2. Barium Titanate (BaTiO3)
3. Zinc Oxide (ZnO)
4. Quartz
5. Polyvinylidene Fluoride (PVDF)
6. Gallium Orthophosphate (GaPO4)
7. Aluminum Nitride (AlN)
8. Lithium Niobate (LiNbO3)
9. Lead Magnesium Niobate (PMN)
10. Lanthanum Gallium Silicate (LGS)

**4. Thermochromic and Photochromic Materials**

1. Vanadium Dioxide (VO2)
2. Liquid Crystal Polymers (LCPs)
3. Tungsten Oxide (WO3)
4. Chromium-Doped Strontium Titanate
5. Azobenzene Compounds
6. Leuco Dye-Based Coatings
7. Spirooxazine Compounds
8. Copper Oxide (CuO)
9. Prussian Blue
10. Iron Oxide Nanoparticles

**5. Nanotechnology-Based Smart Materials**

1. Graphene Oxide
2. Carbon Nanotubes (CNTs)
3. Silica Nanoparticles
4. Gold Nanoparticles
5. Silver Nanoparticles
6. Titanium Dioxide (TiO2) Nanocomposites
7. Zirconium Oxide (ZrO2) Nanoparticles
8. Boron Nitride Nanotubes (BNNTs)
9. Quantum Dots (CdSe, InP)
10. Nanocellulose Fibers

These materials span across various domains and can be used for multiple applications like self-healing, energy harvesting, sensors, coatings, and structural reinforcement