Docket #: S19-250

Solution Processed Metallic Nano-glass Films with High Strength, Elastic Limit and Corrosion Resistance

Stanford researchers have developed a method to make thin films of metallic glass with high strength, elastic limit, and corrosion resistance. These films are composed of metallic glass nanoparticles with high ductility. The nanoparticles are synthesized in solution, deposited into substrates and finally pressed or heated to form ~200 nm to 10 micron thick films. This method ensures the formation of a microstructure, which imparts toughness. The robust mechanical properties and corrosion resistance make these films ideal as coatings for biomedical implants, wear resistant industrial tools, naval parts and microelectronics, and a potential replacement for sputtered protective coatings.

Stage of Research

- Proof of concept

Applications

- **Robust thin film coatings:**
  - Biomedical implants
  - Wear resistant industrial tools
  - Naval parts
  - Microelectronics
- **Corrosion and wear resistant coatings**

Advantages

- **Compatible with delicate substrates**
- Low cost, high volume production
- Improved toughness over sputtered films
- No need to expensive vacuum chambers or high-energy power sources

Publications

- M.T. Kiani, C. M. Barr, S. Xu, D. Doan, Z. Wang, A. Parakh, K. Hattar, X. W. Gu, Ductile Metallic Glass Nanoparticles via Colloidal Synthesis Nano Letters (2020).

Patents

- Published Application: WO2021072341
- Published Application: 20220355378
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