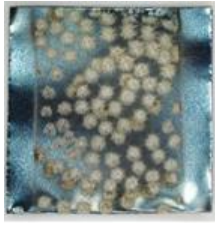
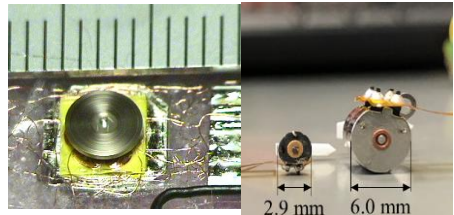
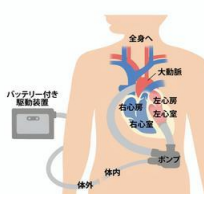


Name	Job Title	Area of Expertise
NAKANO Masaki	Professor	Magnetics
1. Main Research Topics The researcher is engaged in the development of "small permanent magnets" through a "bottom-up approach utilizing film deposition." The objectives of this research are twofold: (1) to contribute to the advancement of novel devices, and (2) to aid in the miniaturization and enhancement of performance of magnets incorporated into existing devices. Three examples are provided below. <u>Topic 1. Development of Micromagnets Using the Laser-Induced Forward Transfer Technique (photo on the right)</u> Micromagnets intended for future applications, such as "insect-shaped microdrones" and "cell separation patterning magnets," necessitate integration with flexible substrates. However, conventional techniques that require high-temperature heat treatment are inadequate. The researcher has independently developed the LIFT method, which facilitates the direct transfer of magnetic materials of any shape at room temperature. The aim is to integrate this method with a multi-material manufacturing process to develop technology for embedding magnetic functions into next-generation medical devices, IoT devices, and other applications.  Patterned micromagnet <u>Topic 2. Development of Rare-Earth Micromagnets Fabricated Using the High-Speed Film Deposition Method for Small Device Applications</u> To generate a magnetic field within a specified volume, the magnet itself must possess a certain volume, which constrains its miniaturization. This study proposes a method for fabricating micromagnets using a distinctive "high-speed pulsed laser deposition" technique. By exploiting the advantages of this method for thick-film deposition to generate magnetic fields, the researcher contributes to the progression of "ultra-small device development" (photo on the right), which is anticipated to experience increased demand in the future.  Miniaturized motors comprising PLD-made magnets <u>Topic 3. Development of Platinum-Based Magnet Ribbons by Combining High-Speed PLD and Exfoliation Phenomena</u> By focusing on the phenomenon where Fe-Pt magnets deposited on silicon substrates using the aforementioned high-speed pulsed laser deposition (PLD) method readily delaminate from the substrate, the researcher has produced Fe-Pt magnet ribbons for use in blood circulation micropumps (photo on the right). In addition to demonstrating excellent biosafety, these ribbons have also exhibited superior mechanical properties, as evidenced by tensile strength and cantilever tests. Research is ongoing, including the lamination of rare-earth magnets. <u>Internal micropump</u> 		
2. Keywords Micro magnets , LIFT (Laser Induced Forward Transfer) technique , PLD(Pulsed Laser Deposition)method, Miniaturized devices		
3. Remarks and Websites In collaboration with multi-material manufacturing processes, we aim to develop this technology as an integrated formation and implementation technology for magnetic functions in next-generation medical devices and IoT devices. researchmap: https://researchmap.jp/read0185023/ Laboratory: https://www.eee.nagasaki-u.ac.jp/labs/magnet/index.html		