Final Year Project Showcase Batch 2019
Year 2023

	Department: Materials Engineering Programme: Bachelors
1	**Project Idea** Surface Modification of Magnesium Alloys through Advanced Coating Processing for Biomedical Applications.
2	**Process** Plasma Electrolytic Oxidation (PEO) process was employed.
3	**Outcome** The enhanced porosity, corrosion resistance, and adhesive coated magnesium alloy.
4	**Evidence (Theoretical Basis)** This project aims to improve the corrosion resistance of magnesium alloys for use in bone implants. By using plasma electrolytic oxidation, silicate and silicate with tri-calcium phosphate coatings are formed on magnesium alloys, enhancing their mechanical strength, corrosion resistance, and bioactivity. The coatings show growth of an apatite layer in simulated body fluid and enhanced adhesive strength, bioactivity, and degradation rate. However, antibacterial activity remains restricted. The modified magnesium alloys have the potential to transform orthopedics and medical implants by minimizing problems of conventional materials and providing enhanced mechanical characteristics, degradation rate, and bioactivity. Further research could lead to safer and more effective implant materials, reducing the need for revision operations and improving patient comfort. This project provides valuable information about developing biomaterial technologies for improved bone implantation solutions.
5	**Impact on Sustainability of Urban Regions or SDG-11 "Sustainable Cities and Communities"** One of the major objective of the project is to make health facilities affordable and accessible for every individual, significantly reducing the numbers of death and help in developing a sustainable region.
6	**Competitive Advantage or Unique Selling Proposition** (Cost Reduction, **Process improvement**, Attainment of any SDG (Sustainable Development Goal**), increase of market share or capturing new market or having superior performance over a competitor**. In summary, any striking aspect of the project that compels the industry to invest in FYP or purchase it. Some detailed description is required in terms of how, why when what. You can select one or more from the following dropdown and delete the rest of them). Please keep relevant options, delete the rest of them, and correct the sequence
a	**Attainment of any SDG** (e.g. How it is achieved and why it is necessary for the region) **SDG#12: Responsible Consumption and Production:** Bioactive coated Magnesium implant is absorbed in the body preventing waste production, where as in steel it required second surgery that generates waste, corrosion of steel is also hazardous to the environment, The Plasma Electrolytic Oxidation (PEO) process is itself an environmental friendly process, by the usage of this process biodegradable magnesium implants can be coated in a sustainable surrounding. Through this process the resources available naturally are consumed with responsibility of generating less waste in neighborhood.

b	**Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process** (e.g. What is the issue is current process and what improvement you suggests) Conventional implants are coated by using different techniques like Sol-gel method, PVD, PEO, CVD, etc. Among these only PEO is the process which is free from post-sintering, this makes it quite efficient and cost effective technique. By using a biodegradable product, it save the cost of implant surgery and production.	
e	**Expanding of Market share** (e.g. how it expand and what is the problem with the current market) Due to high prices and scarcity of raw materials locally, current market condition is wavering. The production of biodegradable implants can support local market. This will lead to more innovative ways of speeding up and standardizing the process.	
7	**Target Market** (Industries, Groups, Individuals, Families, Students, etc) Please provide some detail about the end-user of the product, process, or service.) The target market for this project includes industry, groups, individual etc. Our product should be industrialized for bulk production. Groups of pharmaceutical companies should know about this revolutionizing method for generating bioactive coated implants. Patients need to be aware of such noble treatment available locally.	
8	**Team Members** (Names along with email address	1. Shanza Idrees shanzaidrees5@gmail.com 2. Hareem Fatima hfnuddin6@gmail.com 3. Kainat Ikram kainatikram786@gmail.com 4. Khowaja Muhammad Taha Rab muhammad.taha.rab.1999@hotmail.com
9	**Supervisor Name** (along with email address)	1. Dr. Fayaz Hussain fhussain@neduet.edu.pk 2. Syed Ahmed Uzair uzair1835@gmail.com