

**DRAFT REPORT FOR THE PLASTINDIA INTERNATIONAL UNIVERSITY WEBINAR ON
“PLASTICS IN MEDICAL APPLICATIONS”
SEPT 15TH, 2022**

As per part of a joint program between Plastindia International University, PIU, and UMass Lowell, the seventh webinar on “Plastics in Medical Applications” was delivered by Prof Meg Sobkowicz Kline on Sept 15th, 2022 06:00 PM (IST) / 08:30 AM (EST) onwards.

Ms Pratiksha Jaipal on behalf of Plastindia International University, welcomed all the attendees. She briefly reviewed the earlier webinars presented by Prof Wan Ting Grace Chen, Prof David Kazmer, Prof Stephen Driscoll, Prof Amir Ameli, Prof Davide Masato and Prof Nagarajan.

Jacqueline White, Manager of Corporate Training & Education introduced Prof Meg Sobkowicz Kline who was the speaker for the seventh webinar. She presented the webinar on the introduction to the use of synthetic and natural materials in the medical and health industries. The focus will be on polymeric materials but some mention of metals, ceramics and composites will also be included. The webinar will emphasize the most advanced and well-known successes in biomedical devices.



Dr. Meg Sobkowicz Kline completed her undergraduate studies at Columbia University. It was there that she discovered her interest in human impacts on the planet through a summer course on ecology at the Biosphere II facility in southern Arizona. She worked as a field engineer in the petroleum industry and in the municipal water treatment industry in New Mexico and Colorado before returning to school to complete her doctorate with Professor John Dorgan in the area of renewable polymer nanocomposites. Following her graduate studies she accepted a National Research Council postdoctoral fellowship at

National Institute of Standards and Technology in Maryland to research polymeric materials for photovoltaic applications. Dr. Sobkowicz Kline joined the UMass Lowell Plastics Engineering Department in 2011.

Prof Meg Sobkowicz Kline - Department of Plastics Engineering at the University Of Massachusetts Lowell presented a webinar on the topic – Plastics in Medical Applications on Sept 15th, 2022. The course content was course objectives, overview of biomedical technology, typical polymers used in biomedical devices, attributes of biomedical plastics, case studies and specific applications.

The field of biomaterials includes all medical fields such as orthopaedics, ophthalmology and cardiovascular systems. The new emerging areas are protein drugs, tissue engineering, biosensors and diagnostics. Biomaterials also find applications in cell culture, biotechnological processing, agriculture, etc. Biomaterials are highly regulated and they require multi-disciplinary service. Use of biomaterials can be medical and non-medical fields. She recommended an excellent book – Biomaterials science: Introduction to materials in medicine, authored by BD Ratner, 3rd Academic Press.

OBJECTIVES OF THIS LECTURE

- Identify the engineered materials used in common medical applications
- Communicate effectively regarding the criteria used in selection, design, and use of materials in medical applications
- Relate materials properties to their biocompatibility and identify critical biomaterials problems and properties

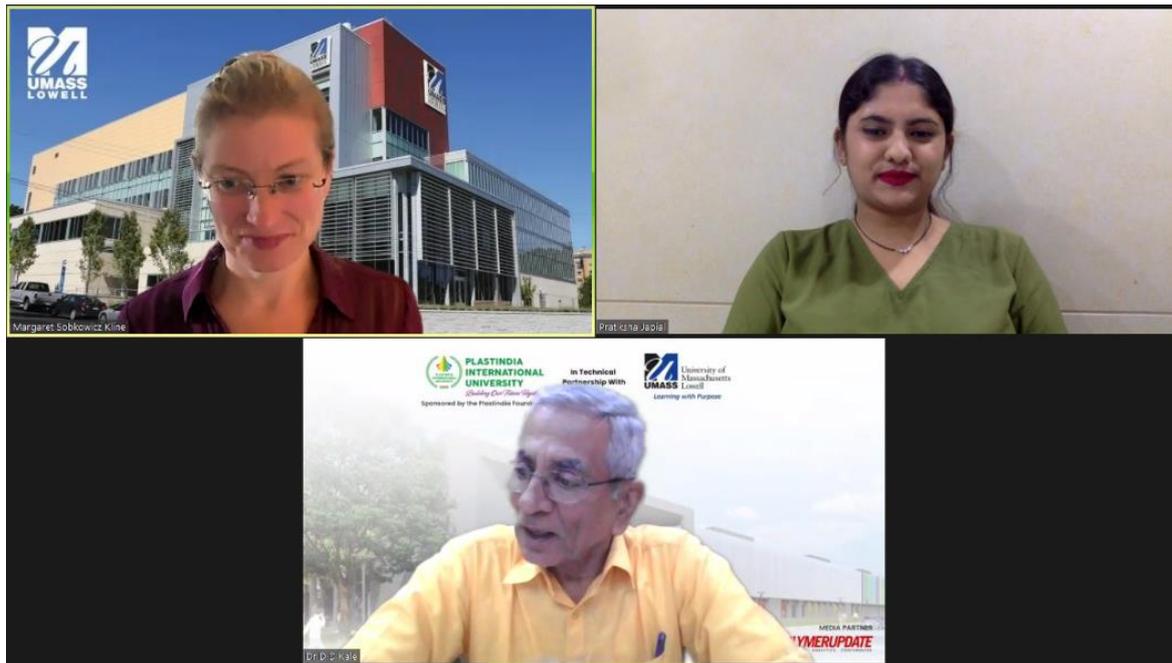
Learning with Purpose

Margaret Sobkowicz Kline

Selection of biomaterials consider suitability of processing techniques, biocompatibility, patient comfort or acceptance, surgical or clinical considerations, FDA considerations, sterilisation cost, and materials availability. In addition, following factors need to be considered: Length of implantations, physiological environment around the implantation, response of materials to body environment, function properties and aesthetics. Five most common implants are eye lenses, ear tubes, arteriovenous stents, prosthetic knees and metal hardware. Global market for biomaterials is \$450 BN. Market segment can be IVD, orthopaedic devices, cardiovascular devices, diagnostic imaging, MIS, wound management, diabetes care, ophthalmic, dental and nephrology.

She reviewed the polymer chemistry briefly. Common polymers used in biomedical applications are poly (lactic acid), polyglycolide, silicones, poly (methyl methacrylate) and

similar acrylates and UH MW Polyethylene. Bulk modulus (GPA) and tensile strength of many polymers were compared. Advantages of UHMW PE in medical devices were highlighted. The uses and properties of many polymers used in medical devices were presented. She explained and elaborated on joint replacement devices. She also described in details the total hip arthroplasty. She presented the pros and cons of various metals used for this application. She reviewed briefly bone cement technology and fibres used in these applications. She explained the stent grafts and vascular grafts. She summarized the webinar as biomedical plastics is a growing field, there will always be a need for plastics in medical devices. Understanding of basic material properties and functionary requirements in human body are essential for development of these devices.



Prof Dr DD Kale reviewed the questions and the questions pertaining to the information already presented during the webinar were screened. How much time does it take to successfully launch a medical device? Prof explained and remarked that it takes several years when a given material may satisfy all the requirements. She also added that the standards and the regulatory procedure are highly tedious and these could be different in different countries. The vote of thanks was presented by Dr DD Kale.

The next webinar will be on Oct 13th, 2022 by Prof Dr. Carol Barry on Newer Systems for Melt Compounding Polymer Systems.