Kārlis Agris Gross

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Dept. of Mechanical and Manufacturing Engineering
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Education:

- Bachelor of Engineering (HIIA in Materials Engineeering), Monash University, 1987
- Master of Engineering Science, Monash Universiy, 1990
  (Surface modification of prostheses)
- Doctor of Philosophy, State University of New York at Stony Brook, USA 1995
  (Amorphous phases in hydroxyapatite coatings)
- Graduate Certificate in Higher Education, Monash University, 2000.

Previous positions:

- Queen Elizabeth II Research Fellow, Monash University (2000-2004)
- Australian Postdoctoral Fellow, University of Technology, Sydney (1997-1999)
- Research Fellow, University of Limoges, France (1996)
- Research Fellow, University of Tampere, Finland (1996)
- Research assistant, State Uni of Stony Brook, USA (1992-1995)
- Visiting esearcher, Technical Uni of Aachen, Germany (1991)
- Visitng researcher, Technical University of Riga, Latvia (1991)

Membership of Professional Societies:

- Australasian Biomaterials Society
- Australasian Ceramics Society
- International Bioceramics Society
- International Thermal Spray Society
- American Society of Materials

Teaching Experience, curriculum development:

- Undergraduate courses in Introduction to Ceramics, Ceramics Engineering, Biomaterials, Engineering Communications, Advanced Materials, Materials Chemistry, Introduction to Mechanical Engineering, Engineering Design & Processes
- Postgraduate course on ceramics
- One week course on bioceramics in Thailand (Aus-Aid programme in 1999)
- Invitation for lecture series on microfabrication by material additive processes

Research Interests
Research areas relate to coatings, thin films, particles, porous materials, biomaterials and material design. Traditionally research was initiated in the area of hydroxyapatite for the application in hard tissue implants. Manufacturing of materials addressed thermal spraying, thin film deposition, liquid flame spraying, oxidation of metal particles in plasmas, particle layering, chemical modification of apatites, porous material design with a new process.

Apatites represent a major field of interest. Many reports of apatites in the literature reflect the complexity and opportunity to tailor the material. It is a thermaly unstable material with the ability to be chemically tailored, and thus is found in teeth, bones, chemical storage, luminescence, biomaterials, dating of minerals, etc. The latest activities with apatite include the investigation of controlling the topography on implant surfaces. Other studies are addressing the use in luminescence and influence of sterilization on the properties.

The significance of material science developments relies on the ability to process the new material in the desired form. Developments in processing involve research into microfabrication that will provide the ability to deposit polymers, ceramics and metals on the same surface protected by a thin film of any material. This development will mark a significant step in advanced manufacturing of new devices starting at the microscale and then offer further benefits at the nanoscale. A new nanoindentor (to provide roughness, hardness, elastic modulus, coefficient of friction, fracture toughness) will arrive in Feb, 2006 and assist the development in this direction.

Supervision of Research
PhD
- Amanda Melville (co-supervisor 2002-2005)

Masters of Biomedical Engineering
- Kathryn Spiers (Iron oxides for magnetically generated, hyperthermic cancer therapy), 2003
- Kinnari Bhadang (Sintered Mechanical Blends of Hydroxyapatite and Fluorapatite for Biomedical Applications), 2003
- Marianne Ooi (Manufacture and degradation of tissue engineering scaffolds), 2004

9 final year project students

Publications
1 book
1 patent
4 chapters in books
70 journal articles (3 review, 7 invited)
28 conference papers