Research (What is it about?)	**Vessel growth and bone regeneration on controlled roughness implant**
UNN authors	*Kuznetsova D., Rodimova S.*
We find (The result)	It is shown that an increase in roughness of biocompatible polymer implant results in better osteogenic differentiation of stem cells (bone regeneration)
Abstract	Lactic acid polymer (polylactide) occupies an important place between biocompatible polymers which are used in tissue engineering. We show that specially "stitched" photoactive ***polylactide with terminal arms*** (methacrylic groups) forms surfaces with ***different roughness*** depending on the molecular weight (arms' length) under the process of photo polymerization (implant formation). We demonstrate that roughness in turn significantly affects osteogenic differentiation of stem cells, i.e. the process of bone regeneration. Implants with heightened roughness provide better regeneration. The optimal option of implant polymer scaffold formed by photo polymerization technique is proposed. It is shown *in vivo* (for a bone defect in mice) that the proposed scaffold ensures accelerated formation of a new bone and ingrowth of blood vessels from the surrounding tissues. These results demonstrate that the cross-linked microstructured tetrafunctional polylactide biocompatible scaffolds are promising microstructures for bone regeneration in tissue engineering.

Representative articles 2017-2018, quartiles	1. *Kuznetsova D., Ageykin A., Koroleva A., Deiwick A., Shpichka A., Solovieva A., Kostjuk S., Meleshina A., Rodimova S., Akovanceva A., Butnaru D., Frolova A., Zagaynova E., Chichkov B., Bagratashvili V., Timashev P.* Surface micromorphology of cross-linked tetrafunctional polylactide scaffolds inducing vessel growth and bone formation. Biofabrication. **9**(2):025009 (2017).	Q1
	Q-index (Qi) for the result	**4**
	high blue	

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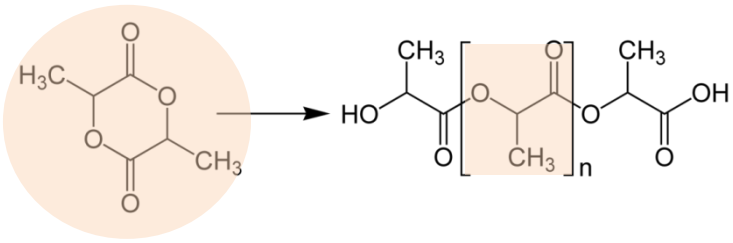
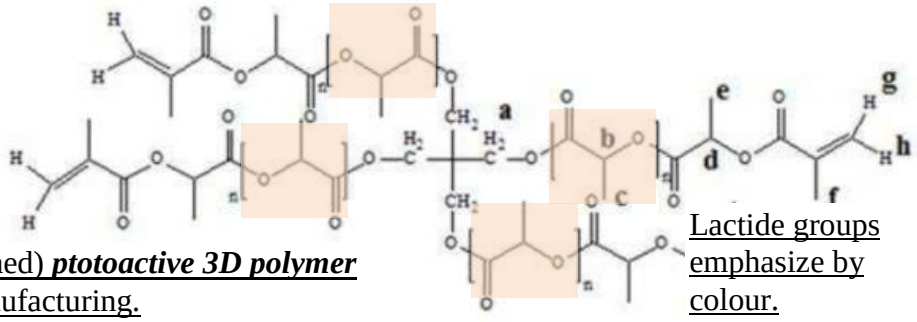
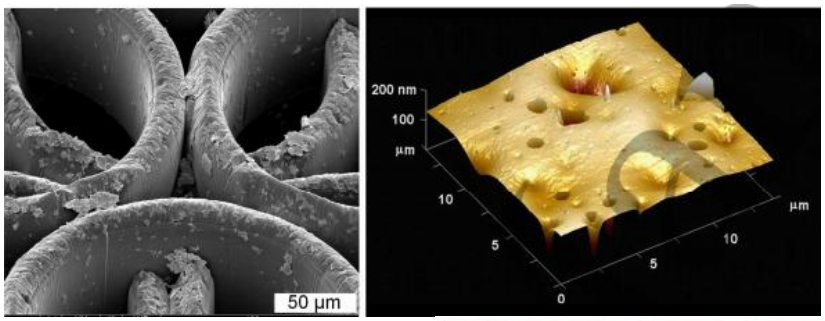


Polymerization of lactide with the cycle disclosure.



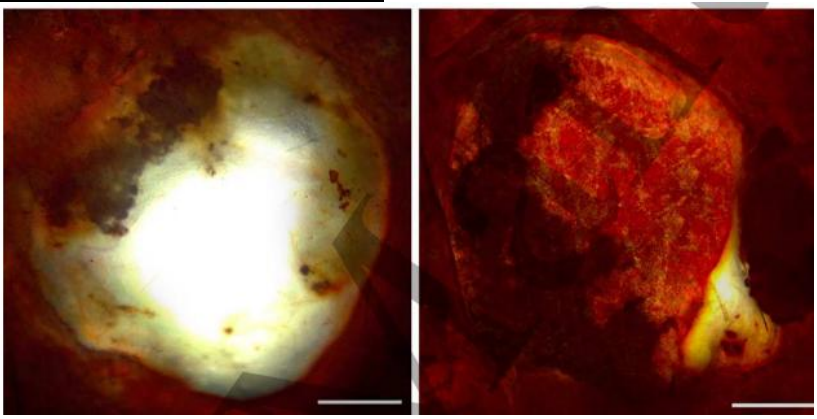
Dendritic (stitched) ***ptotoactive 3D polymer*** for implant manufacturing.

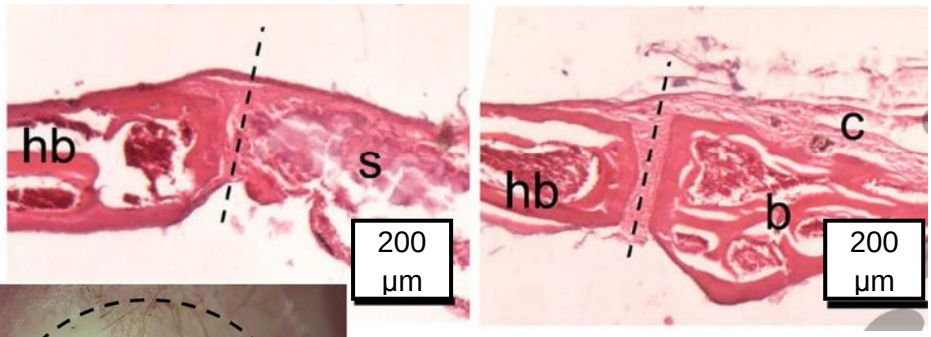
Lactide groups emphasize by colour.

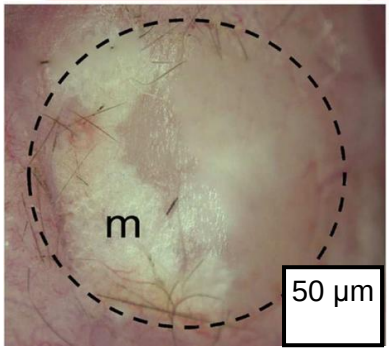


General scanning electron and detailed atomic force microscopy views of the ***scaffold*** ring surfaces (surface roughness).

Bone regeneration on the scaffold after 5 weeks and 10 weeks post-implantation. The red area inside the formed defect indicates the zone of mineralization.







Bone regeneration after 5 weeks and 10 weeks post-implantation: **hb** – host bone tissue, **b** – newly formed bone, **c** – coarse-fibered connective tissue, **s** – scaffold, **m** – mineralization. The dashed line indicates the area of the formed defect.