

**ACS OMEGA**

**Antifungal Effect of Poly(methyl methacrylate) Coated with Polyelectrolyte Multilayers**

Klemen Bohinc,<sup>1</sup> Anamarija Zorc, Tina Velikonja, Franc Rojko, Roman Šušteršič, Aleksander Učakar, Anže Abram, Nives Matjakovič Mitanič, Miha Cekada, Janj Nikolič, and Davor Kovačević

PMMA is widely used in dentistry, primarily for prosthetic applications like dentures, temporary crowns, and orthodontic appliances

Underdenture stomatitis caused by the fungi *Candida albicans* (*C. albicans*) is still an open problem

Substrate: PMMA (polymethyl methacrylate)  
 Polyelectrolytes: poly(allylamine) hydrochloride (PAH) and poly(acrylic acid) (PAA)  
 Pathogenic yeast: *Candida albicans*

Number of layers

1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100

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Surface coverage by *C. albicans* of uncoated polished PMMA and polished PMMA coated with PAA having two different terminating layers, PAH and PAA, as determined by SEM. The number of cells per 5000  $\mu\text{m}^2$  is given

Sample	Number of cells
Uncoated PMMA	52 ± 7
PMMA-(PAH/PAA)-PAH	55 ± 2
PMMA-(PAA/PAA)	21 ± 2

SEM micrographs of uncoated and coated polished PMMA surface with adhered *C. albicans*, first row: PMMA surface without a multilayer, second row: PEM terminating with positively charged PAH, third row: PEM terminating with negatively charged PAA layer

Sample	pH	$\zeta$ / mV
Uncoated PMMA	6.72	-56.3 ± 0.8
PMMA-(PAH/PAA)-PAH	6.70	55.7 ± 0.5
PMMA-(PAA/PAA)	6.34	-22.2 ± 0.4

Zeta potential of the uncoated polished PMMA surface and polished PMMA surface coated with PAA/PAH and PAA as terminating layers

**JPD THE JOURNAL OF PROSTHETIC DENTISTRY**

**RESEARCH AND EDUCATION**

**Adhesion of *Streptococcus mutans* on highly translucent zirconia: Influence of surface properties and polyelectrolyte multilayer coatings**

Ander Abram, PhD,<sup>1</sup> Lana Štever, MSc,<sup>2</sup> Franc Rojko, MSc,<sup>2</sup> Roman Šušteršič, PhD,<sup>1</sup> Tin Klarič, PhD,<sup>1</sup> Davor Kovačević, PhD,<sup>1</sup> Anamarija Zorc, PhD,<sup>1</sup> and Klemen Bohinc, PhD<sup>1</sup>

Zirconia, stabilised with yttria – a widely used dental material due to its biocompatibility and aesthetics

In order to minimize biofilm development, the introduction of polyelectrolyte multilayers is proposed

Substrate: zirconia, stabilised with yttria  
 Polyelectrolytes: chitosan and poly(acrylic acid)  
 Bacteria: *Streptococcus mutans*

Roughness of AS and APA surfaces

Zeta potential of AS and APA surfaces in 0.01 M PBS solution at pH = 7.5

SEM micrographs - AS substrate with 6 (A) and 7 PAA/CS (B) layers. The AS sample without any additional coating is shown in (C).

SEM micrographs - APA substrate with 6 (A) and 7 PAA/CS (B) layers. The APA sample without any additional coating is shown in (C).

**Applied Surface Science**

Improving the surface and optical properties of biocompatible chitosan/carboxymethyl cellulose nanofilms by salt annealing

Anton Holczer,<sup>1</sup> Tin Klarič,<sup>1</sup> Davor Kovačević,<sup>1</sup> Janj Nikolič,<sup>1</sup> and Klemen Bohinc,<sup>1</sup>

Substrate: silica, glass, cherry tomato  
 Polyelectrolytes: chitosan (CS) and carboxymethyl cellulose (CMC)

Salt annealing

c(NaCl)	0.1 mol dm <sup>-3</sup>	1.0 mol dm <sup>-3</sup>	1.0 mol dm <sup>-3</sup>
Duration	1 min, 24 h	1 s, 10 s, 1 min, 24 h, 8 days	1 s

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**Transparent Biocompatible Polyelectrolyte Multilayer Coatings on Apples: Formation and Properties**

Katarina Jerala,<sup>1</sup> Tin Klarič, Rajko Vudrk, Klemen Bohinc, and Davor Kovačević<sup>1</sup>

Substrate: apple (cultivar 'Idared')  
 Polyelectrolytes: chitosan (CS) and carboxymethyl cellulose (CMC)

Preparation: Substrate → Multilayer → Annealing → Surface properties → Optical properties → Application

Water contact angle (WCA) graphs for pH 5.0 and pH 7.0

Reflectance graphs for cherry tomato before and after annealing

- Biocompatible polyelectrolyte multilayers were modified by salt annealing.
- Salt annealing was carried out in a biocompatible NaCl solution.
- Film morphology, wetting, and optical properties were linked to annealing conditions.
- Impact of the film on substrate reflectance was reduced by annealing for only 1 s.
- The optical properties of a coated cherry tomato were successfully improved.

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The apples (cultivar 'Idared', producer Eurosad Krško, Slovenia) – in optimal edible maturity stage

Water contact angles determined during build-up of CS/CMC multilayers on 'Idared' apple surface presented as a function of the number of layers. Odd numbers represent positively charged films with CS as the outermost layer, whereas even number films have negatively charged CMC as the outermost layer

