

- Title:** Urease-carrying electrospun polyacrylonitrile mat for urea hydrolysis
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- Abstract:** Electrospinning was used to fabricate beadless microfibrillar polyacrylonitrile (ePAN) mats with an average fiber diameter of  $1448 \pm 380$  nm from a 10 wt.% PAN in dimethylformamide (DMF) dope solution at applied voltage of 18 kV and 20 cm fiber collection distance. Urease (EC 3.5.1.5) was then covalently immobilized on dispersed microfibrillar ePAN mats following the chemical treatment of fibers with ethylenediamine (EDA) and glutaraldehyde (GA). The optimal concentration of GA for immobilization was 5%. The amount of loaded urease reached  $157 \mu\text{g}/\text{mg}$  mat, exhibiting 54% of the free urease activity. The surface chemistry of as-spun and chemically treated fibers was examined with Fourier transform infrared (FTIR) spectroscopy. Field emission scanning electron microscopy (FESEM) was used to study the morphology and diameter of the pristine, chemically treated, and urease-immobilized microfibrillar mats. Immobilized urease showed increased temperature for maximum activity (from 37 to 50 °C for free and immobilized urease, respectively) and improved storage stability (20 days). The immobilized urease was also less sensitive to the changes in pH, especially in acid conditions. In addition, nearly 70% of initial activity of the immobilized urease was retained after 15 cycles of reuse, which proved the applicability of the electrospun fibers as successful enzyme carriers.