

[REDDIT](#)

# Hi Reddit, we're the biophysical chemistry group at the University of Bath. We work to create smarter medical devices, like wound dressings that change colour when they detect infections. Ask Us Anything!

TOBY\_JENKINS\_GROUP [R/SCIENCE](#)

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r/Science , Hi Reddit, we're the  
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Anything!, *The Winnower*  
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Are you using fluorescent tags in your dressings that cause your color change? Or some other type of color changing antibody complex? I work with color changing tags in my orthopedics lab and am interested in improving the efficacy of it so I don't need to run samples over and over again.

[Soupream](#)

We use 5(6)-carboxyfluorescein, which is a self-quenching dye. We generally encapsulate the dye in some kind of hydrogel reservoir and then release it in response to a certain physiological trigger. Scarlet.

Hi, thanks for the AMA!

My question is about feasibility - if you have to visibly check the colour of the device, how is this different from visibly checking for an infection? Also, how would you observe changes to a catheter that is in place?

[superhelical](#)

Dressing should give early warning of wound getting infected well before clinical symptoms appear

1)Are you looking at just general "yes this wound is infected" or is it sophisticated enough to detect gram positive verses gram negative? 2) how are you differentiating critical colonization versus natural flora?

[LosMinefield](#)

At this stage just wound is infected - no Gram differentiation at this stage, but maybe later.

We measure toxins secreted by Quorum sensing as bacteria hit the CCT

Hey there, nurse here and interested in the diabetic foot ulcers due to my area of work.

Are you using wide spectrum antibiotics on those?

Or are you planning in different dressings, each one loaded with a different antibiotic letting the caretaker decide which one may be the appropriate given the medical record or other factors? For example, having one for *Pseudomonas* and another one for MRSA?

Thanks in advance and I deeply apologize for any mistakes, translating certain terms is quite hard for me.

[Sky3d](#)

We are not currently working on therapeutics, but are interested in DFUs in future. Our view is that early detection of change in wound pathology can allow earlier, more successful clinical intervention

Hi, thanks for doing the AMA.

What makes wound infections so hard to diagnose? Is it a case of not being able to tell until the infection is quite advanced?

[septic bob](#)

Yes, infection is quite uncertain until its advanced - by which point patient is quite sick. Also in burns, the patient temperature is highly unreliable indicator of infection due to burn effect of thermal regulator system. Other problem is systemic inflammatory response which looks like infection - but isn't and can lead to over diagnosis.

Thanks a lot for taking the time to do this!

Does Nanomedicine or Nanotechnology in general play a part in your work? Do you think it might do so in the future?

[EscapistIcewarden](#)

In a sense it is nanomedicine, since dressing incorporates nanocapsules i.e 200 nm diameter vesicles

Cool area of work! Urology person here. Can you tell me more about your catheters that self treat?

[barda\\_\\_](#)

Paper downloadable from here, Scarlet can probably give more info:

<http://www.sciencedirect.com/science/article/pii/S095656631630166X>

A very specific and shop talking question but what antimicrobials do you use for your self treatment? Have you considered bacteriophages?

[traitoro](#)

Hi traitoro, I work on the catheter coatings project, and I have recently managed to prolong the lifespan

of a urinary catheter using bacteriophage. The phage targets the bacteria *Proteus mirabilis*, hence preventing the encrustation and blockage associated with this infection. The paper I wrote on this is currently going through the submission process so watch this space! Previous work within the group has also utilised phage in wound dressings, where they are released in response to elevated skin temperature (<https://www.ncbi.nlm.nih.gov/pubmed/26423908>) or bacterial toxins (<http://pubs.acs.org/doi/pdf/10.1021/cm503974g>). Scarlet.

Thanks for taking the time to do an AMA!

How long do you think it will be before the dressing is available for purchase?

[event3horizon](#)

We hope 3-5 years, depending on various factors such as the regulatory process and getting industry 'buy in'.

A few days ago, I saw a post somewhere else on this site about soldiers in WWI (I think) seeing their wounds glow in the dark, and noticing they healed faster. It turned out to be due to some bacteria that accelerated the healing process. Is the medical science using/researching into that? would that park into your range of study?

[thatpersonrightthere](#)

Probaly pyocyanin secreted by *Pseudomonas aeruginosa* which does glow under UV. Not sure about effect on healing, but is increasing evidence that microbial competition in wounds (or gut or bladder) can harm - or help to heal i.e. faecal transplantation for *C. diff* infections.

Do you think that it would be viable to start a business based off of the technologies that you have developed? Broadening the question, how difficult is it to start a business in the medical device industry?

[Machotaco1717](#)

Not sure - not easy. We hope to partner with existing Healthcare company

Complete non sequitur, Bath is wonderful. Have a pizza and cider for me.

[anticharlie](#)

Will do!

In regards to the bandage for the children's burns, how does the device differentiate from harmful bacteria and harmless ones?

And, Is there just one sort of antimicrobial substance in the wound? How would you know it will treat everything?

[BleedingNitrate](#)

It measures pathogens not bacteria, i.e. detects the molecules which cause the harm, hence non-

pathogenic bacteria are not detected.

Dressing currently does not contain an antimicrobial - that's the future!

In regards to the bandage for the children's burns, how does the device differentiate from harmful bacteria and harmless ones?

And, Is there just one sort of antimicrobial substance in the wound? How would you know it will treat everything?

[BleedingNitrate](#)

The wound dressings are purely diagnostic at the moment, not not focused on treating the wound, but showing clinicians that infection is present. The dressing is filled with small vesicles, whose structure mimics cell membranes. Only the harmful bacteria secrete the correct toxin to break down a cell membrane (and hence, break open the vesicles to release the dye inside!) Scarlet.

What is the next big technological leap in the works for plasters / dressings?

[Whatsthemattermark](#)

We think theranostic dressings which can both monitor wound health and deliver a therapeutic only if required.

What is the cost comparison from your products to traditional products? Do you envision issues convincing providers to spend more to save more later?

Does drainage cloud the results? If I was charting the color would I have an easy time discerning the appropriate color?

RN. Extraordinarily interested

[Carlot\\_Bridge-End](#)

We hope production cost for small dressing to be < €2, once we can mass produce, therefore retail under €5. Cost is critical and we hope to undertake health economic modelling in future.

Trauma surgeon just here to say that you are doing the Lord's work!

[kaaaaath](#)

That's very kind, thank you! Scarlet.

Trauma surgeon just here to say that you are doing the Lord's work!

[kaaaaath](#)

Thankyou - we are trying! :)

What are some of the procedural hurdles you go through when taking these from trials in the lab to a clinical setting? Also, has your group considered using MOFs in any of these modifications, perhaps for timed drug release?

[EnigmaticShark](#)

Probably cost of GMP / regulatory compliant manufacture. This will be expensive, and there's no easy work around in terms of costs.

Do you think that regulatory approval timeframes in your industry are a hinderance?

[BrightenthatIdea](#)

I understand the need for the regulatory process, but doesn't make it easy, and essentially precludes 'cottage industry' manufacture i.e. forces us to partner with large companies for production. Which may or may not be a bad thing.

Are you going to invent something not cool but really useful, such as fast microbiology analysis instead of usual ~several days long tests in a Petri dish? (not sure how it's named properly in English)

I mean, it would be super useful in cases when doctor needs to prescribe some antibiotics, to know exactly which one to prescribe.

Also other idea, more cool than the first one: condoms which immediately detects STI & VD and so on and change color :)

[norlin](#)

Atlas Genetics, UBath spin-off company have super cool, PCR based gene detection technology which could be used - in principle:

<http://atlasgenetics.com/>

I always read about these amazing medical devices. When are these awesome advancements actually going to be used in everyday life?

Thanks, keep up the great work.

[jabba\\_the\\_wut](#)

Our ultimate aim is to get these products to market as soon as possible to improve the quality of care for the people who need them. All products must be approved for efficacy and safety before human use and this can be a lengthy process. Approval can take years but hopefully once in the clinic they will help others for years to come.

Laura

I always read about these amazing medical devices. When are these awesome advancements actually going to be used in everyday life?

Thanks, keep up the great work.

[jabba\\_the\\_wut](#)

We hope within 3-5 years, depending on many potential mountains to climb along the way - mainly related to funding! The next phase will cost about €5 million (at least) and this funding not yet secured.

Could it be possible to wear a patch that could detect and indicate hormone levels? For example, checking for the LH spike before ovulation.

[Awkward\\_Dog](#)

Check out the application of microneedle dressings!

Laura

Could it be possible to wear a patch that could detect and indicate hormone levels? For example, checking for the LH spike before ovulation.

[Awkward\\_Dog](#)

Possible - but not by us! outside of our field!

What is the likelihood of getting a false positive or false negative result? Are there controls in place to prevent this?

[zhangover](#)

Good question - we are currently carrying out an ex-vivo patient study to help try and answer this question. We are taking dressings from patients, removing bacteria, culturing a biofilm and placing dressing on top. This is 'blinded' - we don't know patient condition. Will find out results in 1 year.

The big problem with infection diagnosis in burns is there is no clinical definition of exactly what is infection.. Makes the study tricky..

What's your favorite type of pizza?

[neon-blue](#)

I love all pizza!

Laura

What's your favorite type of pizza?

[neon-blue](#)

The pizzary kind. Scarlet

I did a degree in Chemistry and one in Polymer Science & Engineering and have been looking for a job more relevant to my interests. I quite like the world of medical devices and pharmaceuticals but I don't

really want to go back into academia. So my question is:

How often do groups like yours with new and interesting technology spin out into independent companies, and how does one go about finding them?

[la508](#)

Not too often - spinning out companies is tricky and risky. We may as a last resort. Suggest google to find them..

Welcome!

Have you felt or predict that affects will begin to be felt following the UK leaving the EU in your department/field? I have several friends who have had to leave their positions at different pharma companies due to relocations, and I'm curious how long (if at all) this will affect academia.

[ItsNotOkToHit](#)

Leaving the UK is very bad news for UK science and universities, in my view. Science is inherently collaborative - leaving the EU makes this harder.

I had an idea about creating a patch which could be stuck on food packaging so that it could change color when expired, could you guys do that?

[thelostreader](#)

It is a very good idea that is already in development by other research groups. I believe Insignia Technologies do work in this area. There have been several press releases on this technology too.

I had an idea about creating a patch which could be stuck on food packaging so that it could change color when expired, could you guys do that?

[thelostreader](#)

Good idea! Depends on bacteria, not sure of main bacterial pathogens in food - bit out of our area

So uh, what color does it change to?

[CongoSmash666](#)

Fluorescent green

<http://pubs.acs.org/doi/abs/10.1021/acsami.5b07372>

How does your treatment of burns vary against that of scalds?

[First-Of-His-Name](#)

Scalds are just a subset of burns caused by hot liquid rather than flame etc. Scalds are most common in young children but treated in similar way to other burns with regime depending on burn size and depth

Have you got any currently practicing doctors or nurses involved in your development processes?

I work as a doctor, and I see all these new technologies coming out that are very impressive, but are actually not of any clinical use because there are one or two flaws to their design.

How does your dressing tell the difference between a clinically significant wound infection and subclinical colonization. A dressing that changed color in response to colonization would mean patients will be getting antibiotics they don't need, putting them at risk of side effects. I'd love to find out more about how those urinary catheters work. Pretty much all urinary catheters get 'infected' (nitrite/lueocyte esterase+, cultures positive). Just knowing there's an infection there isn't useful. But if they could predict a patient about to become overtly septic from that infection, that would be huge. Also, how cost effective are these? The NHS won't be putting thousand pound dressings on patients any time soon!

#### [CytokineShitStorm](#)

We work very closely with the paediatric burn steam at the Bristol Children's Hospital. You are right, clinical guidance is essential and lack of can lead to products which have no market - or use.

The dressing distinguishes between critical and sub critical colonisation by measuring the QS regulated toxins released as the bacterial density reaches a level which corresponds to critical colonisation.

A major rationale for our dressing is hopefully is will lead to fewer patients receiving unnecessary antibiotics and treatment. Current evidence is that burn infection is probably way over diagnosed, when patient actually had systemic inflammatory response. Therefore dressing should lead to greater reassurance that wound is not infected when it isn't.

Have you got any currently practicing doctors or nurses involved in your development processes?

I work as a doctor, and I see all these new technologies coming out that are very impressive, but are actually not of any clinical use because there are one or two flaws to their design.

How does your dressing tell the difference between a clinically significant wound infection and subclinical colonization. A dressing that changed color in response to colonization would mean patients will be getting antibiotics they don't need, putting them at risk of side effects. I'd love to find out more about how those urinary catheters work. Pretty much all urinary catheters get 'infected' (nitrite/lueocyte esterase+, cultures positive). Just knowing there's an infection there isn't useful. But if they could predict a patient about to become overtly septic from that infection, that would be huge. Also, how cost effective are these? The NHS won't be putting thousand pound dressings on patients any time soon!

#### [CytokineShitStorm](#)

RE catheters: The coating we have developed is activated in response to increased urinary pH, which is caused exclusively by P.mirabilis bacteria. Since infections by P.mirabilis can lead to episodes of endotoxic shock and septicaemia, it is important that we can distinguish between this bacteria and the other colonising strains that cause mainly asymptomatic infection (as you said). Luckily, since there is such a clear physical trigger involved with Proteus infection, it makes it very easy for us to target these infections specifically by employing a pH-responsive polymeric system (polymethylmethacrylate-co-methacrylic acid) See my paper on infection-detecting catheter coatings for more details:

<http://www.sciencedirect.com/science/article/pii/S095656631630166X>



Scarlet

Hello! Couple questions from a chemistry masters student here;

- 1) How did you get into this field of work/research? Seems like quite an interdisciplinary field, what kind of scientific backgrounds do you have?
- 2) How close are we to seeing products like these being used in normal hospitals?
- 3) Has the (semi)recent decision to leave the eu affected your research at all? (funding etc)

[Inked\\_Owl](#)

Hello! Hope you're planning on doing a PhD after the masters!

1) We all did masters degrees ourselves, mainly in chemistry and then have taught ourselves microbiology as we go along. Generally, we have all done our master's projects in the group and then decided to stay. However, a couple of PhD students have come in via findmeaphd.com. 2) The wound dressings are in pre-clinical ex vivo patient studies at the moment, so those are the closest to being available in the clinic. The rest of the work is purely proof-of-concept at this stage, but you have to start somewhere! 3) It's hard to tell at this stage, although a lot of our funding (about £1 million) has come from the EU so we were very sad about the referendum result! Science is also by nature a multinational field, with collaboration and travel between institutions essential, so we do also worry about the effect of the EU referendum on the quality of research in the UK. Scarlet.

Are you coming to Love Saves The Day? I would be happy to buy you a pint of you are. Hopefully see you there

[mansguiche](#)

I wish! Very kind offer though, thank you :) Scarlet.

Excluding financial and technological barriers, what do you like least about what you do?

[PanicLiz](#)

When I spill artificial urine all over myself! Scarlet

Excluding financial and technological barriers, what do you like least about what you do?

[PanicLiz](#)

In scientific research, 90% of what you do doesn't work - which can be frustrating! 10% usually makes up though!

Excluding financial and technological barriers, what do you like least about what you do?

[PanicLiz](#)

The smell of some bacteria!

Laura

Serious part of the question: If you're using fluorescent dyes that glow when introduced to early stage infection, how concentrated are these dyes and, if it's not proprietary, what detection method beyond the "eye" test are you implementing? Is there an electronic sensor built into the dressing and in what way are you screening for functional groups in the detection of pathogenic-only bacteria? I'm curious as cells express a large number receptors and functional groups that could be similar.

Non-serious: Have you considered the fact you are at University of "Bath" and helping scrub out infections?

[Zhiall](#)

The carboxyfluorescein dye is at a concentration of 50 mM until it is released/ diluted. In the lab we use a plate reader to accurately measure changes in fluorescence intensity, although it's important that the colour changes are detectable by eye, as this is how they will be used in the clinic.

What programming languages / technologies you use for those devices and who does the coding?

[truth\\_sentinell](#)

We don't code anything! We're good chemists and microbiologists but terrible computer scientists :)

Thanks for putting yourself out there for an AMA. Group wise what are your backgrounds? Were you all Biochemists all the way from undergrad or have members of your group shifted from other disciplines?

[sadeofdarkness](#)

Hi! We are mainly chemists who have learnt microbiology as we go along! Laura is the odd one out though as she started out life as a pharmacist and through superhuman perseverance has taught herself both chemistry and microbiology! We also have an ex-mechanical engineer in the group. Scarlet.

Thanks for putting yourself out there for an AMA. Group wise what are your backgrounds? Were you all Biochemists all the way from undergrad or have members of your group shifted from other disciplines?

[sadeofdarkness](#)

We are principally Chemists , but have PGs with backgrounds in Microbiology and Pharmacy.

I [Toby] did my PhD in corrosion - so have shifted a long way!

Hi! Thank you very much for doing this AMA.

I would like to know about any breakthroughs, discoveries or epiphanies that you guys had during your research.

Also, how did you became interested in this area of research? How did this amazing idea came to your

minds?

[JBaqueroH](#)

I became interested in this project as I am personally interested in drug delivery and the formulation science behind this (that's the pharmacist in me). This project interested me as it was based on stimulus release of diagnostics and therapeutics. Also I could see a real clinical problem and how my research can make a difference.

As for the epiphany - I'll let you know.

Laura

Hi! Thank you very much for doing this AMA.

I would like to know about any breakthroughs, discoveries or epiphanies that you guys had during your research.

Also, how did you become interested in this area of research? How did this amazing idea come to your minds?

[JBaqueroH](#)

Most of research is hard, often tedious work. Epiphanies happen maybe 1% of time, if we're lucky!

I became interested in infection about 10 years ago - from chatting to colleagues in University bar after work..

How much has the misuse of anti-biotic/anti-viral medicines had on the human's ability to fight back naturally?

[sidewalkgum](#)

I don't think it has affected the body's ability to naturally fight infection, except in gut disease such as C. diff, where antibiotics kill all good bacteria but not C. difficile, allowing for very nasty infections. The big issue is that over use of antibiotics has led to strong evolutionary selection pressure for resistance i.e. MRSA.

I've read some time ago that animals (dogs, etc.) can detect cancer (maybe another disease as well, can't remember exactly) by the different scent exhaled by a person's skin.

Is it possible, if so is your group working to create devices based on a specific scent of an ill person?

[catsmustdie](#)

There is work on wound detection by odour:

<https://info.uwe.ac.uk/news/uwenews/news.aspx?id=2335>

Not by us though.

Are you working on any field dressings? There has to be something better than a quick clot bandage.

[idlikearefund](#)

The wound dressings that change colour are designed for burn wounds, so in theory have applications for blast wound injuries in the field. As the dressing changes colour to alert of infection, the dressing changes can be targeted to only when they are required, hence less scarring.

Outside of acquiring approval of regulatory bodies, what are the biggest barriers to getting these devices to market?

[noonesbabydoll](#)

One of the biggest barriers is funding to progress the dressing through clinical trials which are very expensive. Additionally, being able to manufacture the prototypes to industrial standards for such studies.

Outside of acquiring approval of regulatory bodies, what are the biggest barriers to getting these devices to market?

[noonesbabydoll](#)

The cost of manufacture the pilot scale dressings which are reg compliant - this requires production line to be built / modified for pilot scale production. This will be expensive..

How do you come up with research projects? Are they mostly blue ocean science or industry funded applications?

[AgentG91](#)

Projects build on ideas which themselves build on things we have read, or done long ago. Probably the ultimate source of idea for this project was learning about history of medicine when I was a 14 year old at school..

how much asphalt do i need for a 1800sqft overlay at 2in with 3/8 fine?

[GypsySenpai](#)

Don't work in imperial units!

What's it like daily to work in that field? It's something that interests me but idk what I wanna do with my life

[ThePaulHammer](#)

Very up and down! When things work, there's no better job but when they don't (more often than not) it can be hard to stay motivated. Scarlet.

Is there any devices to draw blood without a needle stick yet? Needles are just very painful and cruel esp. if the patient is a child.

[SparklyPen](#)

Yes, there are devices being developed but not by our group. This is one application of microneedles.

Laura

Is the Bath short for something? And if so, how are your archrivals at the University of Shower doing? :]

[CowboysSB82Champs](#)

Bath is a city named after the Roman Baths which were founded in about 75 AD. Scarlet

Not sure if this has been asked, but diabetic foot ulcers and burns in general are notoriously colonized by normal skin flora which makes conventional swabbing almost useless. Do you dressings account for this flora? Or is any flora an indiscriminate indicator of infection?

The same goes for some indwelling catheters, most people use the in-out method for sampling urine (insertion of a new foley), because we assume the catheter has already been colonized by flora.

Edit: I think swabbing is actually useful in burns! I will have to look it up. Still a medical learner.

[Dhaliwns](#)

Someone in our group (not present today) works on using the increase in skin temperature observed in cases such as diabetic foot ulcers, to release a therapeutic agent from a smart wound dressing. Hence, the antimicrobial is only released in the time and place in which it is needed. In regards to the catheter question, the trigger we use for those coatings is pH, meaning that we can accurately target infections by *P. mirabilis*, as their potent urease enzyme causes a rapid rise in urinary pH. Therefore we use physical triggers, which come about as a result of infection, in order to target the pathogens that are dangerous to the patient, rather than commensal flora. Scarlet.

Not sure if this has been asked, but diabetic foot ulcers and burns in general are notoriously colonized by normal skin flora which makes conventional swabbing almost useless. Do you dressings account for this flora? Or is any flora an indiscriminate indicator of infection?

The same goes for some indwelling catheters, most people use the in-out method for sampling urine (insertion of a new foley), because we assume the catheter has already been colonized by flora.

Edit: I think swabbing is actually useful in burns! I will have to look it up. Still a medical learner.

[Dhaliwns](#)

Indeed, issue is arguably not the bacteria itself, but what the bacteria is doing. Most bacteria on skin is non-pathogenic, but can have toxin producing genes switches on by changes in local environment such as bacterial density i.e. in a biofilm. We don't detect bacteria directly, we detect secreted virulence factors. Or in our catheters, pH rise due to urease activity from pathogenic *P. mirabilis*.

In a healing wound bacterial population is kept under control by immune system, in a non-healing wound, immune response (plus maybe cellular issues such as vascularisation, oxygen levels in tissue etc) prevent wound healing and allow bacteria to proliferate.

Why isn't it University of Shower? Showers are far better for the environment and also healthier for the body

[bluew200](#)

Tell the Romans that, they named the city!

Hi Toby,

If you were to (hypothetically) write an antibiotics exam question, what would it be?

[JacobDM](#)

Toby just left but nice try though ;)

Laura

Hi! I was wondering for diabetic people if it would be possible for there to be some kind of implant in the blood stream that could notify them if their blood sugar is too low, rather than having to do it the current ways?

[ASlyRS](#)

Yes, technology exists - but not our area..

Are you testing on animals?

[idealatry](#)

We are doing ex-vivo porcine skin models at the moment, but not live animals. Scarlet

How long before I can buy color changing bandages at the local pharmacy?

[fnordfnordfnordfnord](#)

5-10 years, I guess

Are you upset or happy that Cadillacs is closing?

[spongeboobsparepants](#)

I'm too old! [Toby]

What is Bath's nightlife like? I'm considering going to Bath uni.

[FleshEatinThugRpIInt](#)

Rubbish. Go to Bristol!

What type of hydrogels or polymers do you think have the most potential in these sort of applications?

[chem4u](#)

Generally we try to select hydrogels that are biocompatible, both in their inherent nature, but also in terms of cross linking agents. For this reason, PVA is one of our favorites as it will crosslink cryogenically (i.e. we pop it in the freezer overnight), so we can avoid the use of any potentially toxic crosslinking agents. Scarlet

What type of hydrogels or polymers do you think have the most potential in these sort of applications?

[chem4u](#)

We currently use agarose, but it's not a great polymer in terms of sterilisation or mechanical stability. Working with Paul Hartmann (German company) on propriety gels..

Do you see these dressings in use by military field medics?

[vpp20ice](#)

These dressings have potential for application in any field that wound infection is an issue so it could definitely be used by military field medics.

Laura

Do you see these dressings in use by military field medics?

[vpp20ice](#)

Not at the moment, although the dressings have got potential in terms of blast wound injuries.

Do you see these dressings in use by military field medics?

[vpp20ice](#)

Definitely in future.

What would you say is the beat medical invention of all time (so far)?

[green49285](#)

Fertiliser! Without fertiliser the world's population would have been capped many years ago!

What would you say is the beat medical invention of all time (so far)?

[green49285](#)

Antisepsis and vaccines [Toby]

Ever been to bath North Carolina?

[fcmetro](#)

Sadly not!

I'd like to ask a simple question that's alright:

What color does it change into?

[MoeNasrul](#)

Fluorescent green! <http://pubs.acs.org/doi/abs/10.1021/acsami.5b07372>

Scarlet

I'd like to ask a simple question that's alright:

What color does it change into?

[MoeNasrul](#)

It reminds me of a glow stick!

Laura

What did you guys think of Alien:Covenant? Thumbs up or Thumbs down?

[zebulo](#)

Haven't seen it - everyone knows students are too poor to go to the cinema! Scarlet

What did you guys think of Alien:Covenant? Thumbs up or Thumbs down?

[zebulo](#)

I haven't see it either!

Laura

How often does someone at or in referring to your school make a bath-related pun?

[Gatewayalk](#)

Every day. Even our student's union is called The Plug and the Tub!

How often does someone at or in referring to your school make a bath-related pun?

[Gatewayalk](#)

Not so often - we live here! people outside make the jokes!



How often does someone at or in referring to your school make a bath-related pun?

[Gatewayalk](#)

It comes in waves - see posts from this thread. :)

Laura

Cant you make a device that makes us(over weight folks) thin? Maybe a less expensive stomach balloon?

[seventomatatoes](#)

Sadly not! Wish I could!

Why is bath the best city in the UK and how many times do you visit al falafels per week?

[jakegt1](#)

This is a trick question. Bath is the best city in the world BECAUSE of Al Falafels. Scarlet.

Why is bath the best city in the UK and how many times do you visit al falafels per week?

[jakegt1](#)

Is it best city in UK? :)

How often do y'all take baths?

[xVictor](#)

Once a week, whether we need one or not! :)

Is there standards being created for this tech? We don't want the situation where one company's bandage goes from white to blue and another goes from blue to red. Now depending on brand, blue could mean infected or not infected.

[DonArcangel](#)

Use of dressings including expected changes and relationship to infection will all be included in dressing information pack - including photos and illumination guidance. But this will be in future.

What exactly are you detecting to determine the presence of infection?

What's the threshold for colour change?

What is the detectable spectrum of bacterial infection (Gram positive, Gram negative, Pseudomonas)?

[bayesienne](#)

We measure presence of cytolytic toxins secreted by bacteria as their density in wound reaches critical (pathological) levels. Principally the Phenol soluble Modulin peptides from *S. aureus* (gram +) and rhamnolipids from *P. aeruginosa* (Gram -). These are two most frequently identified wound pathogens in acute wounds and burns.

See: <http://pubs.acs.org/doi/abs/10.1021/acsami.5b07372>

Hello there, are you planning to make a device which would help us with food poisoning?

[iamabudi](#)

Not really - we have no expertise in gut pathogens..

Do you have just one mechanism of reaction to the toxins? Around how many different bacteria toxins can your dressing detect currently? Are you worried that doctors or nurses will pick it up and follow by it completely?

I mean if your dressing doesn't react to a specific bacterias toxin, the wound will still be infected but no color change will happen. I could see this leading to a patient becoming infected, but not treated because the nurse or doctor doesn't believe it is infected because the color hasn't changed.

[readyforhappines](#)

The dressing detects cell membrane damaging toxins, principally phenol soluble modulin peptides and rhamnolipids. We are working on other methods to detect lipases, esterases, proteases and hyaluronidases which are associated with infection.

I work in medical coding in billing. What are the costs of this? Is this something that people will opt in to, or is it going to be a standard? I can imagine that these kinds of will be significantly more expensive than standard dressing. And while I do believe that it would be a great advancement, I'm left wondering what kind of hospital will willingly choose to pay more for medical supplies when they already hire doctors and nurses for this kind of thing.

[Shubiee](#)

We hope to retail at < €5 / small dressing, though not sure. A Health Economic analysis will hopefully show overall cost reduction via their use.

I'm a patent attorney that worked on very similar technology back almost 20 years ago. Even back then, I recall that the prior art was rather crowded.

This kind of technology seems quite useful so I would have expected it to be wide spread by now. However, I've never actually encountered it in a commercial product. What sort of challenges have been preventing its wide-spread implementation?

[geniel1](#)

It's just an incredibly slow process to get products through from the proof-of-concept stage to the clinical stage. There are many hoops to jump through before we can even get to full clinical trials, but

we're getting there!

Surgeon working in third world country here. Just want to ask, is there an application of such wound dressings in third world countries. What's the cost-benefit analysis say about the product? And does it work on the same basis as the newer sutures with heat and infection sensors in it?

[drjackripper](#)

Yes, there could totally be applications for these dressings in third world countries. In remote locations where people may be miles from medical resources such dressings could be employed with instructions such as return for treatment if there is a colour change or with a theranostic dressing (both diagnosis and treatment in one device) patients wounds can be self treated outside of a medical facility. Currently, the dressing is activated by the presence of bacterial toxins although we are also researching alternative sensors for wound applications.

Laura

I really want to follow a career path in either Biophysics or biomedical engineering. What are the differences between the two? Which entails more of a researched based profession?

Thanks in advance, really try to figure out path I want to take in my education/career.

[PimpDimples](#)

They are very different. Biophysics is study of membranes etc - essentially physics of bio systems, Biomedical engineering is more close to what we do - creating devices for medical diagnostics or therapy.